

**PROJECT MANUAL**

for

**LTBB ODAWA INDIANS**

**Government Center Archives Expansion**

**PROJECT NO. 232-15**

**February 29, 2016**



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**DOCUMENT 00 01 01**

**PROJECT TITLE PAGE**

**PROJECT NAME:** LTBB ODAWA INDIANS  
Government Center Archives Addition

**OWNER:** LTBB Odawa Indians  
7500 Odawa Circle  
Harbor Springs, MI 49740  
Contact: Bryan Gillett, Planning Director  
PH: (231) 242-1580

**ARCHITECT:** Anthony Esson, Architect

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Gaylord, MI 49734

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Frederic, MI 49733

Contact: Anthony P. Esson, Architect, LEED AP  
PH: (989) 732-0585  
Email: tony@anthonyessonarchitect.com

**MEP ENGINEER:** JLK Engineering  
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Gaylord, MI 49735  
Contact: Justin Kowatch, PE  
PH: (989) 448-4631  
Email: jkowatch@jlkengineering.com



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**DOCUMENT 00 11 16**

**INVITATION TO BID**

**Project:**

Government Center Archives Expansion

**Owner:**

Little Traverse Bay Bands (LTBB) of Odawa Indians  
7500 Odawa Circle  
Harbor Springs, MI 49740

**Architect/Engineer:**

Anthony P. Esson, Architect  
PO Box 479  
Gaylord, MI 49734

Date: February 29, 2016

LTBB Odawa Indians will receive Bids from General Contract Bidders for construction of an addition and renovations to the existing LTBB Odawa Indians Governmental Center located at 7500 Odawa Circle, Harbor Springs, Michigan 49740.

Sealed Bids may be mailed or delivered in person to LTBB Odawa Indians, c/o Bryan Gillett, Planning Director; 7500 Odawa Circle, Harbor Springs, MI 49740. Bids must be received prior to 2:00 PM local time on the 13th day of April, 2016. Bids will be opened and read aloud at 2:00 PM, April 13, 2016 in Room 312 of the Governmental Center located at 7500 Odawa Circle, Harbor Springs, MI 49740. The Owner will not consider or accept a bid received after the date and time specified for bid submission.

There will be a Pre-Bid Meeting conducted by the Owner and Architect/Engineer at 1:00 PM local time, Wednesday, April 6, 2016. The meeting will convene in the Tribal Council Chambers of the Administration Building Commons located at 7500 Odawa Circle, Harbor Springs, MI 49740. The Pre-Bid Meeting will consist of a brief informational meeting followed by an opportunity for Bidders to examine the Project site. Attendance by Bidders is mandatory. Attendance by Sub-bidders is not mandatory, but is strongly encouraged.

Bidding Documents will be available on or about March 21, 2016. Bidding Documents will be available to Bidders in electronic format (.pdf) free of charge by emailing Shari Temple, Planning Assistant at [stemple@ltbbodawa-nsn.gov](mailto:stemple@ltbbodawa-nsn.gov) with a request for Bidding Documents. Bidders notifying Shari Temple will be included on the Bidders List.

Bidding Documents will also be on file for inspection at the following locations:

LTBB Odawa Indians Planning Department  
Builders Exchange Traverse City, Grand Rapids, Lansing, and Saginaw  
CDC News Michigan  
Construction Association of Michigan  
Construction News Corporation  
Reed Construction Data

McGraw Hill, F.W. Dodge

Bidders must not appear as listed parties that are excluded from receiving Federal contracts, certain subcontracts, and certain Federal financial and nonfinancial assistance and benefits, pursuant to the provisions of 31 U.S.C. 6101, note E.O. 12549, E.O. 12689, 48 CFR 9.404, and each agency's codification of the Common Rule for Nonprocurement suspension and debarment. Bidders shall include certification regarding suspension and debarment on the Form provided in the Bid Documents.

The work to be performed under this contract is subject to the requirements of section 3 of the Housing and Urban Development Act of 1968, as amended, 12 U.S.C. 1701u (section 3). The purpose of section 3 is to ensure that employment and other economic opportunities generated by HUD assistance or HUD-assisted projects covered by section 3, shall, to the greatest extent feasible, be directed to low- and very low-income persons, particularly persons who are recipients of HUD assistance for housing.

**Davis Bacon and Related Acts (DBRA).** DBRA are administered by the Wage and Hour Division. Contractors and subcontractors performing on federally funded or assisted contracts in, in excess of \$2,000.00 for the construction, alteration or repairs are required to pay their laborers not less than the prevailing wage rates and fringe benefits as determined by Department of Labor (DOL) and listed on the web site ([www.dol.gov](http://www.dol.gov)) under the Wage and Hour Division (WHD) for corresponding classes of laborers employed on similar project in the area and are listed in this contract (**MI160118 02/26/2016 MI118** "Davis-Bacon Wage Determination"). Apprentices may be employed at less than predetermined rates if they are in an apprenticeship program registered with the DOL or with a state apprenticeship agency recognized by the DOL. Trainees may be employed at less than predetermined rates if they are in a training program certified by the DOL. Contractors and subcontractors on prime contracts in excess \$100,000.00 are required, pursuant to the Contract Work Hours and Safety Standards Act, to pay employees one and one-half times their basic rates of pay for all hours over 40 worked on covered contract work in a workweek. **Covered Contractors and subcontractors are also required to pay employees weekly and to submit weekly certified payroll records to LTBB, the contracting agency, to the LTBB Accounting Office or designee (form wh347).** (40 USC §276a; 29 CFR Parts 1, 3, 5, 6 and 7).

A Bid security in the amount of 5 percent of the Bid Sum in the form of a Bid Bond, or certified check payable to the Owner shall accompany each Bid. A personal or company check does not constitute a Bid security.

Refer to other bidding requirements described in Document 00 21 13.

Bids shall be submitted on the Bid Form provided in the Bidding Documents.

The successful Bidder will be required to furnish Performance and Labor/Material Payment Bonds in the amount of 100% of the contract amount.

Bids will be required to be submitted under a condition of irrevocability for a period of 60 days after submission.

The Owner reserves the right to accept or reject any or all Bids, either in whole or in part; to award the Contract to other than the lowest Bidder; to waive any irregularities and/or informalities; and in general to make awards in any manner deemed to be in the best interest of the Owner.

**END OF DOCUMENT**

**DOCUMENT 00 21 13**

**INSTRUCTIONS TO BIDDERS**

**1.1 SUMMARY**

**A. Document Includes:**

1. Bid submission.
2. Intent.
3. Work identified in contract documents.
4. Contract Time.
5. Definitions.
6. Contract Documents identification.
7. Availability of documents.
8. Examination of documents.
9. Inquiries and Addenda.
10. Product substitutions.
11. Site examination.
12. Prebid conference.
13. Bidder qualifications.
14. Subcontractors.
15. Submission procedure.
16. Bid ineligibility.
17. Prevailing Wage Requirements.
18. Certification of the Contractor.
19. Security deposit.
20. Performance Assurance.
21. Bid Form requirements.
22. Fees for changes in the Work.
23. Bid Form signature.
24. Additional bid information.
25. Selection and Award of Alternates
26. Bid opening.
27. Duration of offer.
28. Acceptance of offer.

**B. Related Documents:**

1. Invitation to Bid.
2. Bid Form - Stipulated Price (Single-Prime Contract).
3. Document 00 45 03 – Debarment, Suspension, and Ineligibility Affidavit.
4. Document 00 45 05 – Non-Collusion Affidavit of Bidder.
5. Form HUD-5369-A (11/92) Representations, Certifications, and Other Statements of Bidders.
6. AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum.
  - a. Definitions.
  - b. Contract Time identification.
  - c. Tax exempt procedures.
  - d. Contractor's fees for changes.
  - e. Contractor's liability insurance.
  - f. Bond types and values.
  - g. Liquidated Damages

## 1.2 BID SUBMISSION

- A. Bids will be received by LTBB Odawa Indians, c/o Bryan Gillett, Planning Director; 7500 Odawa Circle, Harbor Springs, MI 49740 until 2:00 PM local time on Wednesday, April 13, 2016.
- B. Bids submitted after the above time will not be considered.
- C. Amendments to submitted Bids will be permitted when received in writing prior to bid closing and when endorsed by the same party or parties who signed and sealed the Bid.
- D. Bidders may withdraw their Bid by written request at any time before bid closing.

## 1.3 INTENT

- A. The intent of this Bid request is to obtain an offer to perform work to complete construction of a an addition and remodeling, including associated site work for a Stipulated Price contract, in accordance with Contract Documents.

## 1.4 WORK IDENTIFIED IN CONTRACT DOCUMENTS

- A. Work of this proposed Contract comprises construction of an addition and remodeling, and associated site work.
- B. Location: 7500 Odawa Circle, Harbor Springs, MI 49740.

## 1.5 CONTRACT TIME

- A. The Owner requires the work of this contract be substantial complete and approved for occupancy not later than September 30, 2016. Liquidated damages as identified in the agreement apply.
- B. Contractor shall achieve Final Completion not later than November 30, 2016. Liquidated damages as identified in the agreement apply.
- C. Liquidated Damages: Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed and approved for occupancy by applicable Governing Authorities within the time agreed upon, plus any extensions of time as allowed by the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal proceeding the actual loss suffered by the Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as penalty) Contractor shall pay the Owner Five Hundred Dollars (\$500) for each day that expires after the specified date of Substantial Completion until the Work is Substantially Complete and Two Hundred Fifty Dollars (\$250) for each day that expires after the specified date of Final Completion until the Work is Finally Complete. Liquidated Damages charges shall be deducted from the Contractor's progress payment or final payment as applicable. The Owner reserves the right to demand legal proceedings should the actual loss exceed the damages provided herein.

## 1.6 DEFINITIONS

- A. Bidding Documents: Contract Documents supplemented with Invitation to Bid, Instructions to Bidders, Bid Form, and bid securities, identified.



- B. Contract Documents: Defined in AIA Document A201-1997 Article 1, including issued Addenda.
- C. Bid: Executed Bid Form and required attachments submitted in accordance with these Instructions to Bidders.
- D. Bid Price: Monetary Price identified by the Bidder in the Bid Form.

#### 1.7 CONTRACT DOCUMENTS IDENTIFICATION

- A. The Contract Documents are identified as AEA Project No. 232-15; Government Center Archives Expansion for LTBB Odawa Indians; as prepared by Anthony Esson, Architect and identified in the Project Manual.

#### 1.8 AVAILABILITY OF DOCUMENTS

- A. Bidding Documents may be obtained as stated in Invitation to Bid.
- B. Bidding Documents are made available only for the purpose of obtaining offers for this Project. Their use does not grant a license for other purposes.

#### 1.9 EXAMINATION OF DOCUMENTS

- A. Bidders are responsible for full examination of the specifications and any addenda prior to submission of Bids.
- B. Bidding Documents are on display at the offices of the Owner and construction association plan room facilities as indicated in the Invitation to Bid.
- C. Upon receipt of Bidding Documents verify documents are complete. Notify Architect/Engineer if documents are incomplete.
- D. Immediately notify Architect/Engineer upon finding discrepancies or omissions in Bidding Documents.
- E. The Architect has endeavored to prepare Bidding Documents without conflicts or inconsistencies, however, it shall be recognized by the Bidder that conflicts and inconsistencies in Bidding Documents do occur. As such, in the case of a conflict or inconsistency in the Bidding Documents that affects the Bid price, the Bidder shall include and/or shall be deemed to have included the higher quantity or quality of Product or material, and/or more labor intensive or costly installation in the Bid.
- F. The Architect has endeavored to coordinate the various aspects of the project in preparation of the Bidding Documents, however, it shall be recognized by the Bidder that components of the Work of any one trade may be identified at various locations throughout the Bidding Documents. As such, the successful Bidder shall be responsible for the Work identified in the Contract Documents as a whole without regard to the specific location of the information within the Contract Documents.

#### 1.10 INQUIRIES AND ADDENDA

- A. Direct questions in writing to Anthony P. Esson, at the office of the Architect/Engineer; e-mail at [tony@anthonyessonarchitect.com](mailto:tony@anthonyessonarchitect.com).

- B. Verbal answers are not binding on any party.
- C. Submit questions not later than March 25, 2016. Replies will be made by Addenda.
  - 1. Questions submitted after March 25, 2016 will not be responded to.
- D. Addenda may be issued during bidding period. Addenda will be posted on Owner's website and sent to construction association plan room facilities. Addenda become part of the Contract Documents. Include resultant costs in the Bid Price.

#### 1.11 PRODUCT SUBSTITUTIONS

- A. Where Bidding Documents allow "or equal" Products, substitutions may be made at the Bidder's discretion. Products substituted shall provide equal function, performance, dimension, appearance and quality as provided by the specified product. The Architect reserves the right to reject substitutions not meeting criteria for equal function, performance, dimension, appearance and quality. In that event, Contractor will be required to provide products meeting equal function, performance, dimension, appearance and quality criteria at no additional cost to the Owner. Preapproval for products specified as "or equal" prior to the submission of Bids is not required, and will not be acknowledged by the Architect.
- B. Where the Bidding Documents stipulate particular Products with no provisions for substitutions, substitutions will not be considered. The Architect will not acknowledge or respond to requests for substitutions for products specified "no substitutions" or "substitutions not permitted".
- C. Where Bidding Documents stipulate particular Products with provisions for substitutions, substitution requests will be considered by Architect/Engineer up to March 25, 2016.
  - 1. Substitution requests received after March 25, 2016 will not be responded to.
- D. With each substitution request, provide sufficient information for Architect/Engineer to determine acceptability of proposed products.
- E. When a request to substitute a Product is made, Architect/Engineer may approve the substitution. Approved substitutions will be identified by Addenda.
- F. In submission of substitutions to Products specified, Bidders shall include in their Bid, changes required in the Work and changes to Contract Time and Contract Price to accommodate such approved substitutions. Later claims by the Bidder for an addition to the Contract Time or Contract Price because of changes in Work necessitated by use of substitutions will not be considered.

#### 1.12 SITE EXAMINATION

- A. Examine Project site before submitting a Bid.

#### 1.13 PREBID CONFERENCE

- A. A Pre-Bid Meeting conducted by the Owner and Architect/Engineer at 1:00 PM local time, Wednesday, April 6, 2016.
- B. The meeting will convene in the Tribal Council Chambers of the Administration Building Commons located at 7500 Odawa Circle, Harbor Springs, MI 49740.

- C. The Pre-Bid Meeting will consist of a brief informational meeting followed by an opportunity for Bidders to examine the Project site.
- D. Attendance by Bidders is mandatory. Attendance by Sub-bidders is not mandatory, but is strongly encouraged.
- E. Representatives of the Owner and Architect/Engineer will be in attendance.
- F. Information relevant to Bidding Documents will be issued by Addendum.

#### 1.14 BIDDER QUALIFICATIONS

- A. To demonstrate qualification for performing the Work of this Contract, Bidders may be requested to submit written evidence of financial position, previous experience, current commitments, and license(s) to perform work.

#### 1.15 SUBCONTRACTORS

- A. The Owner reserves the right to reject a proposed Subcontractor for reasonable cause.
- B. Refer to AIA Document A201-2007, Article 5.

#### 1.16 SUBMISSION PROCEDURE

- A. Bidders shall be solely responsible for delivery of Bids in manner and time prescribed.
- B. Submit one copy of executed offer on Bid Forms provided, signed and sealed with required security deposit in a closed opaque envelope, clearly identified with Bidder's name, Project name, and Owner's name on the outside.
- C. An abstract summary of submitted Bids will be made available to all Bidders following bid opening.

#### 1.17 BID INELIGIBILITY

- A. Bids that are unsigned, improperly signed or sealed, conditional, illegible, obscure, contain arithmetical errors, erasures, alterations, or irregularities of any kind, may be declared unacceptable at Owner's discretion.
- B. Bid Forms, and enclosures which are improperly prepared may be declared unacceptable at Owner's discretion.
- C. Failure to provide security deposit, bonds or insurance requirements may invalidate the Bid at the discretion of the Owner.
- D. Bidders that are debarred, suspended or otherwise ineligible to receive Federal contracts, certain subcontracts, and certain Federal financial and nonfinancial assistance and benefits, pursuant to the provisions of 31 U.S.C. 6101, note, E.O. 12549, E.O. 12689, 48 CFR 9.404, and each agency's codification of the Common Rule for Nonprocurement suspension and debarment are not eligible for contract award.

#### 1.18 PREVAILING WAGE REQUIREMENTS

- A. This project is subject to compliance with the Davis Bacon Act.
- B. **Davis Bacon and Related Acts (DBRA)**. DBRA are administered by the Wage and Hour Division. Contractors and subcontractors performing on federally funded or assisted contracts in, in excess of \$2,000.00 for the construction, alteration or repairs are required to pay their laborers not less than the prevailing wage rates and fringe benefits as determined by Department of Labor (DOL) and listed on the web site ([www.dol.gov](http://www.dol.gov)) under the Wage and Hour Division (WHD) for corresponding classes of laborers employed on similar project in the area and are listed in this contract (**MI160118 02/26/2016 MI118** "Davis-Bacon Wage Determination") . Apprentices may be employed at less than predetermined rates if they are in an apprenticeship program registered with the DOL or with a state apprenticeship agency recognized by the DOL. Trainees may be employed at less than predetermined rates if they are in a training program certified by the DOL. Contractors and subcontractors on prime contracts in excess \$100,000.00 are required, pursuant to the Contract Work Hours and Safety Standards Act, to pay employees one and one-half times their basic rates of pay for all hours over 40 worked on covered contract work in a workweek. **Covered Contractors and subcontractors are also required to pay employees weekly and to submit weekly certified payroll records to LTBB, the contracting agency, to the LTBB Accounting Office or designee (form wh347).** (40 USC §276a; 29 CFR Parts 1, 3, 5, 6 and 7).

#### 1.19 CERTIFICATIONS OF THE CONTRACTOR

- A. Bidders shall execute and submit Document 00 45 03 - Debarment, Suspension, and Ineligibility Affidavit, with the Bid.
- B. Bidders shall execute and submit Document 00 45 04 – Non-Collusion Affidavit of Bidder, with the Bid.
- C. Bidders shall execute and submit Form HUD-5369-A (11/92) Representations, Certificates, and Other Statements of Bidders, with the Bid.

#### 1.20 SECURITY DEPOSIT

- A. Bids shall be accompanied by security deposit as follows:
  - 1. Bid Bond of a sum no less than 5 percent of the Bid Price on standard surety company form.
  - 2. Certified check in the amount of 5 percent of the Bid Price
- B. Endorse Bid Bond in name of the Owner as obligee, signed and sealed by the principal (Contractor) and surety.
- C. Endorse certified check in name of the Owner.
- D. Security deposits will be returned after execution of the Owner Contractor agreement.
- E. If no contract is awarded, security deposits will be returned.

#### 1.21 PERFORMANCE ASSURANCE

- A. Accepted Bidder: Provide a Performance and Payment bond as described in AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum.

- B. Include the cost of performance assurance bonds in the Bid Price.

#### 1.22 BID FORM REQUIREMENTS

- A. Complete requested information in the Bid Form and Bid Form Supplements.
- B. Refer to AIA Document A201-2007, Article 3.6, procedures for sales tax exemption.

#### 1.23 FEES FOR CHANGES IN THE WORK

- A. When the Architect/Engineer establishes that the method of valuation for Changes in the Work will be net cost plus a percentage fee in accordance with General Conditions, the percentage fee allowed for Overhead and Profit shall be Ten Percent (10%) on the net cost of work by the General Contractor, and Ten Percent (10%) on the gross cost of work by a Subcontractor.

#### 1.24 BID FORM SIGNATURE

- A. Sign Bid Form, as follows:
  - 1. Sole Proprietorship: Signature of sole proprietor in the presence of a witness who will also sign. Insert the words "Sole Proprietor" under the signature. Affix seal.
  - 2. Partnership: Signature of all partners in the presence of a witness who will also sign. Insert the word "Partner" under each signature. Affix seal to each signature.
  - 3. Corporation: Signature of a duly authorized signing officers in their normal signatures. Insert the officer's capacity in which the signing officer acts, under each signature. Affix the corporate seal. If the Bid is signed by officials other than the president and secretary of the company, or the president/secretary/treasurer of the company, submit a copy of the by-law resolution of their board of directors authorizing them to do so, with the Bid Form in the bid envelope.
  - 4. Joint Venture: Signature of each party of the joint venture under their respective seals in a manner appropriate to such party as described above, similar to requirements for Partnerships.

#### 1.25 ADDITIONAL BID INFORMATION

- A. Any Bidder shall, upon request of the Owner/Architect, complete and submit the following within 24 hours of Bid opening.
  - 1. List of Subcontractors: Include names of all Subcontractors and portions of the Work each Subcontractor will perform.

#### 1.26 SELECTION AND AWARD OF ALTERNATES – Not Used

#### 1.27 BID OPENING

- A. Bids will be opened and read aloud at 2:00 PM, March 30, 2016.
- B. Location of Bid Opening: Room 312 of the Governmental Center located at 7500 Odawa Circle, Harbor Springs, MI 49740.
- C. The Owner will not consider or accept a bid received after the date and time specified for bid submission.

1.28 DURATION OF OFFER

- A. Bids shall remain open to acceptance and shall be irrevocable for a period of 60 days after bid closing date.

1.29 ACCEPTANCE OF OFFER

- A. The Owner reserves the right to accept or reject any or all offers.
- B. After acceptance by the Owner, the Architect/Engineer on behalf of the Owner, will issue to the accepted Bidder, a written letter of Contract Award.
- C. Notwithstanding delay in the preparation and execution of the Agreement, accepted Bidder shall be prepared, upon written Notice to Proceed, to commence work within seven days following receipt of official written order of the Owner to proceed, or on date stipulated in such order.
- D. The accepted bidder shall assist and cooperate with the Owner to prepare the Agreement, and within 7 days following its presentation shall execute Agreement and return it to the Owner.

**END OF DOCUMENT**

**DOCUMENT 00 31 00**

**AVAILABLE PROJECT INFORMATION**

**1.1 SUMMARY**

- A. Document Includes:
  - 1. Subsurface investigation report.
- B. Related Documents:
  - 1. Document 00 21 13 - Instructions to Bidders: Site examination.

**1.2 SUBSURFACE INVESTIGATION REPORT**

- A. A copy of a geotechnical report from the original building is included with this document, titled Geotechnical Evaluation Report, dated June 29, 2001, and prepared by Soils and Materials Engineers, Inc.
- B. This report identifies properties of below grade conditions.
- C. Recommendations described are not requirements of this Contract, unless specifically referenced in Contract Documents.
- D. This report, by its nature, cannot reveal all conditions existing on the site. Should subsurface conditions be found to vary substantially from this report, changes in design and construction of foundations will be made, with resulting credits or expenditures to Contract Price/Sum accruing to Owner.

**END OF DOCUMENT**



## GEOTECHNICAL EVALUATION REPORT

PROPOSED ADMINISTRATION BUILDING  
LITTLE TRAVERSE BAY BAND OF ODAWA INDIANS  
LITTLE TRAVERSE TOWNSHIP  
EMMET COUNTY, MICHIGAN

SME PROJECT NO. BG38976  
JUNE 29, 2001



Consultants in the geosciences, materials and the environment

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June 29, 2001

Mr. Brian Gillett  
LTBB of Odawa Indians  
Planning Department  
915 Emmet Street  
P.O. Box 246  
Petoskey, Michigan 49770

RE: Geotechnical Evaluation Report  
Proposed Administration Building  
Little Traverse Bay Band of Odawa Indians  
Little Traverse Township  
Emmet County, Michigan  
SME Project No. BG38976

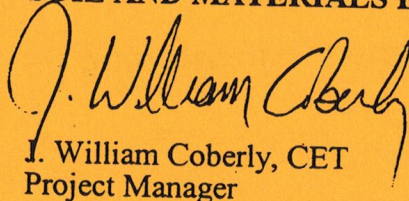
Dear Mr. Gillett:

We have completed the geotechnical evaluation for the proposed LTBB of Odawa Indians Administration Building to be constructed in Little Traverse Township, Emmet County, Michigan. This report presents the results of our observations and analysis, and our recommendations for subgrade preparation, foundation design, and pertinent construction considerations.

We appreciate the opportunity to assist you with this project. If you have questions regarding this report, please contact us.

Very truly yours,

**SOIL AND MATERIALS ENGINEERS, INC.**

  
J. William Coberly, CET  
Project Manager

Attachment: Geotechnical Evaluation Report  
Distribution: Ms. Audrey L. Perry – LTBB of Odawa Indians (1 pc)  
Mr. John Ernst – Wade Trim, Inc. (1 pc)

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## SUMMARY

The report conclusions and recommendations are summarized as follows:

1. Soil conditions encountered at the soil boring locations generally consist of sandy topsoil overlying medium dense, natural fine to coarse sands, which extended to the explored depths of the soil borings. Groundwater was not encountered at the soil boring locations.
2. Spread footing foundations are recommended for support of the proposed structure. A maximum net allowable soil bearing pressure of 3,500 psf is recommended for footings bearing on the natural sands, or on engineered fill overlying these soils. Higher allowable soil bearing pressures are feasible, but are likely not required due to the anticipated light building loads. Some compaction of the foundation bearing soils should be expected due to disturbance/drying of the subgrade during excavation. For dry subgrade conditions, water may need to be added to facilitate compaction of the natural sands. Compaction should be performed just prior to placement of the foundation concrete.
3. The natural sands encountered are expected to be suitable subgrade for support of floor slabs, pavements or the placement of engineered fill, and also for reuse as engineered fill, provided the specified compaction requirements can be satisfied. Based on a cursory review of the natural sands, an estimated range of the coefficient of permeability (k) of 0.1 to 0.001 feet per minute is suggested.
4. Based on the soil borings, groundwater seepage or accumulation is generally not anticipated during construction. It appears most groundwater accumulations (if any) in shallow excavations can be controlled using normal sump and pit methods.

The summary presented above is general in nature and should not be considered apart from the entire text of the report with all the qualifications and considerations mentioned therein. Details of our findings and recommendations are discussed in the following sections and in the appendices of this report.

### REPORT PREPARED BY:

Joseph L. Noykos  
Project Engineer

### REPORT REVIEWED BY:

Larry P. Jedele, PE  
Principal Consultant





## **1. INTRODUCTION**

This report presents the results of our geotechnical evaluation for the proposed LTBB of Odawa Indians Administration Building to be constructed in Little Traverse Township, Emmet County, Michigan. This evaluation was authorized by Ms. Audrey L. Perry of the LTBB of Odawa Indians, per our proposal dated May 11, 2001.

### **1.1 Site Conditions**

The site is located northwest of the intersection of Hathaway and Pleasant View Roads in Little Traverse Township, Emmet County, Michigan. The parcel generally consisted of heavily wooded, vacant land. However, several trees had been previously cleared to allow access to the soil boring locations. Based on a site topographic plan prepared by Wade Trim, Inc., the project civil engineer, the ground surface generally varied from about elevation 740 feet to 748 feet. No structures were noted on the property at the time of the field exploration.

### **1.2 Project Description**

The proposed development will consist of the construction of an administration building for the LTBB of Odawa Indians. We understand the proposed structure will be a single story, slab-on-grade structure consisting of three individual wings off a centrally located oval apex. The apex portion of the building will consist of 'open air' design requiring moderate roof spans. Structural loads are anticipated to be relatively light. Asphalt parking areas will be situated northwest and east of the building, with access drives from Hathaway and Pleasant View Roads.

A final site-grading plan, detailing the proposed finish floor elevation and grading elevations, was not available at the time this report was prepared.

### **1.3 Scope of Services**

The scope of services for this evaluation is described in our proposal dated May 11, 2001. The services were performed in general accordance with our proposal.

## **2. EVALUATION PROCEDURES**

### **2.1 Field Exploration**

Seven soil borings were performed for this evaluation on June 5, 2001 within the footprint of the proposed building and pavement areas, extending to about 6 to 20 feet below the existing ground surface. The approximate soil boring locations are shown on the Soil Boring Location Diagram included in Appendix A. The number, depths, and locations of





the soil borings were determined by Wade Trim, Inc., the project civil engineer. The soil borings were located in the field by Wade Trim. Ground surface elevations were estimated to the nearest 1 foot from the Overall Plan drawing prepared by Wade-Trim, Inc., dated 3/30/01.

The soil borings were drilled using a rotary-type, truck-mounted drill rig, and were advanced to the sampling depths using continuous flight hollow stem augers. The soil borings included soil sampling based upon Split-Barrel Sampling Procedures. The samples were sealed in glass jars in the field and returned to the laboratory for further observation and testing.

Groundwater measurements were recorded during drilling and immediately after completion of the drilling operations. At completion of the soil borings, the boreholes were backfilled with auger cuttings. Therefore, long-term groundwater level information is not available from these soil borings.

The soil boring log includes materials encountered, penetration resistances, and pertinent field observations made during the drilling operations. The soil boring logs are included in Appendix A.

## **2.2 Laboratory Testing**

The soil samples were classified in general accordance with the Unified Soil Classification System. Since the soil samples were granular in nature, no additional testing was performed.

The soil samples were visually classified in general accordance with the Unified Soil Classification System (USCS). The estimated group symbol, according to the USCS, is shown in parentheses following the textural description of the various stratum on the soil boring logs in Appendix A. The appended General Notes sheet includes a brief summary of the general method of describing the soil and assigning an appropriate USCS group symbol.

The results of the laboratory testing are included on the soil boring logs contained in Appendix A.

Soil samples retained over a long time, even in sealed jars, are subject to moisture loss and are no longer representative of the conditions initially encountered in the field. Therefore, soil samples are normally retained in our laboratory for 30 days and then disposed, unless instructed otherwise.





### 3. SUBSURFACE CONDITIONS

#### 3.1 Soil Conditions

Soil conditions encountered at the soil boring locations consisted of sandy topsoil overlying medium dense, fine to coarse natural sands, which extended to the explored depths of the soil borings. The following gives a generalized summary description of the soils encountered in the soil borings performed at the subject site, beginning at the ground surface and proceeding downward:

**Stratum 1: Topsoil.** The driller reported encountering approximately 8 to 14 inches of sandy topsoil at the surface of the soil borings.

**Stratum 2: Natural Fine to Coarse Sand (SP).** Natural fine to coarse sands, with varying amounts of gravel, were encountered extending from beneath the topsoil to the explored depths of the soil borings. Standard Penetration Test resistances (N-values) of 11 to 21 blows per foot (bpf) were obtained in the natural sands, indicating a medium dense condition.

The soil descriptions and properties, in addition to groundwater conditions observed by the driller, are graphically presented on the soil boring logs appended to this report along with a soil boring location diagram. Please refer to the soil boring logs for the soil conditions at the specific soil boring locations. Stratification lines on the soil boring logs indicate a general transition between soil types. They are not intended to show an area of exact geological change. The soil descriptions are based on visual classification of the soils encountered.

#### 3.2 Groundwater Conditions

During, or immediately following drilling operations, groundwater was not encountered at the locations of the soil borings.

Based on the granular nature of the soils encountered, we believe the long-term groundwater level is below the explored depths of the soil borings. However, hydrostatic groundwater levels, elevations and volumes of groundwater should be expected to fluctuate throughout the year, based on variations in precipitation, evaporation, run-off and other factors. The observations at the soil borings represent conditions at the time the readings were taken. The actual groundwater levels at the time of construction may vary.

### 4. ANALYSIS AND RECOMMENDATIONS

Based on the information available from the seven soil borings drilled for this evaluation, shallow spread foundations, bearing on the natural fine to medium sands or on engineered fill overlying these sands, are recommended for support of the proposed





structure. Higher allowable soil bearing pressures are feasible, but are likely not required due to the anticipated light building loads.

The natural sands, if properly prepared, are generally considered suitable subgrade for support of slabs-on-grade, pavements and engineered fill. Furthermore, the existing sands are generally considered suitable for re-use as engineered fill, provided they are conditioned, placed and compacted according to the recommendations contained herein.

Groundwater seepage during foundation construction is generally not anticipated to be a significant factor during construction.

Our specific recommendations for site earthwork, foundations, and slab-on-grade construction are presented below.

#### **4.1 Site Preparation and Earthwork**

##### **4.1.1 General Site Subgrade Preparation**

Within the footprint of the proposed building and pavement areas, and 5 feet beyond, we recommend any vegetation, trees, topsoil, root mats, or other deleterious materials, if encountered, be removed from the surface to expose the natural sands.

Several large trees are currently within the building footprint. Such large trees may have deep and extensive root systems, as well as associated organic seams. Special care should be taken during subgrade preparation within the building pad to completely remove the root systems and related organic seams.

Once the site has been stripped and cut to design site grades, the exposed subgrade should be thoroughly compacted using a heavy, self-propelled vibratory roller. We recommend several passes in each direction, and the surface compacted to a minimum of 95 percent of the maximum dry density as determined by the Modified Proctor test. Water may need to be added to the subgrade to facilitate compaction if dry conditions are encountered.

Engineered fill placed for utilities, walks, and slabs or to achieve final site grades should be placed and compacted per the recommendations in the "Engineered Fill Requirements" section of this report (Section 4.1.3).

##### **4.1.2 Subgrade Preparation for Floor Slabs**

Once the subgrade has been prepared as discussed in the previous section, and prior to concrete placement, the final floor slab subgrade should be observed by SME and again thoroughly compacted. If constructed during warmer periods of the year, the subgrade may dry out and become unstable under construction traffic. Consideration may be given to placement of a 4 to 6 inch layer of dense graded aggregate (MDOT22A or MDOT21AA) to stabilize the subgrade prior to construction of the floor slab.



In general, we recommend providing vapor barriers below floor slabs that will receive an impermeable floor finish/seal, or a floor covering which would act as a vapor barrier. Even if these floor coverings are not planned, the vapor barrier can reduce the transmission of moisture vapor from the ground into the building, which can occur due to thermal and humidity variations and other conditions. However, the placement of a vapor barrier affects construction of the floor slab, concrete curing, and the rate of moisture loss as the concrete dries. We would be pleased to discuss considerations related to vapor barriers with you in more detail, if desired.

Slabs should be separated by isolation joints from structural walls and columns bearing on their own footings to permit relative movement. A minimum of six inches of engineered fill should be provided between the bottom of the slab and the top of the shallow spread footing below, or grade beams, or other arrangements should be made to allow for relative settlements.

The slab-on-grade subgrade soils should be protected from frost during winter construction. Any frozen soils should be thawed and compacted or removed and replaced prior to slab-on-grade construction.

#### **4.1.3 Engineered Fill Requirements**

Any fill placed within the proposed building footprints, including utility trench backfill, should be an approved material, free of frozen soil, organics, or other deleterious materials. The fill should be spread in level layers not exceeding 9 inches in loose thickness and should be compacted to a minimum of 95 percent of the maximum dry density as determined in accordance with the Modified Proctor test.

Based on the information from the soil borings, the existing natural sands encountered at the soil boring locations are generally considered suitable for use as general site engineered fill, and backfill of foundations and trenches, provided they meet the requirements listed in the previous paragraph. If the proposed fill contains more than 4 percent organics, we recommend such materials not be used for engineered fill.

In confined areas (such as backfill for foundations, below-grade walls or utility trenches), and other areas where compaction is accomplished primarily by hand-operated equipment, or where drainage is required, such as near below-grade walls and leachate fields, granular material meeting the gradation requirements of MDOT Class II is recommended as backfill. Based on visual observations, the natural sands generally appear to meet the requirements for MDOT Class II sand. Based on a cursory review, we estimate the coefficient of permeability ( $k$ ) of the natural sands to be in the range of about 0.1 to 0.001 feet per minute (fpm). However, particle size distribution tests should be performed as a means of verifying this permeability range prior to construction.



## 4.2 Foundations

Spread foundations are recommended for support of the proposed building. A maximum net allowable soil bearing pressure of 3,500 psf is recommended for footings bearing on the natural sands, or on engineered fill overlying these soils. Higher allowable soil bearing pressures are feasible, but are likely not required due to the anticipated building loads. Suitable bearing soils were encountered just below the surficial topsoil, generally about 1 to 1.5 feet below the ground surface.

It has been our experience with similar soil conditions that granular soils may become loosened from 12 to 24 inches below the subgrade level from the excavation activities. As a result, the exposed bearing surface may require compaction with vibratory equipment prior to placing foundation concrete to achieve the recommended allowable bearing pressure. All foundation bearing surfaces should be observed and tested by SME. We recommend the contractor be prepared to compact the bearing surface where loose or disturbed soils are encountered. For loose soils less than 6 inches thick, a hand operated plate compactor may be used. For loose soils, which extend deeper than 6 inches, we recommend a heavy-duty hydraulic vibratory plate compactor be used, such as a Hoe-Pac. In addition, water may need to be added to dry soils to facilitate the compaction of the sand if dry subgrade conditions are encountered.

Once each footing area is exposed and compacted, field testing by a qualified geotechnical engineer should be performed by a proven method for sand subgrade. Housel penetrometers are not appropriate for these soils and their use will give misleading results. Furthermore, the test method must be capable of testing the soils several feet below the bearing level. We recommend SME be at the construction site to perform tests at footing locations to verify the bearing pressure, prior to constructing the footings.

Foundations should be adequately embedded below final grades for protection against frost heave during normal winters. The proper embedment depth will be dependent on local building codes. In addition, it is important to maintain a vertical sidewall for the footing, and not allow the footing to "mushroom out" at the top. The sands are highly susceptible to caving and sloughing. Therefore, we believe the foundation excavations will have to be sloped back and forms placed for foundation and foundation wall construction.

For bearing capacity and settlement considerations, isolated spread footing type foundations should have a minimum dimension of at least 30 inches, and continuous strip footing foundations should be at least 18 inches wide.

We estimate total settlement for spread foundations for the proposed structures, using the recommended bearing pressure, to be one inch or less. Differential settlements are



estimated to be about one-half the total settlement. This settlement estimate provided is based on the available soil boring information, and the anticipated light structural loads.

#### **4.3 Construction Considerations**

Groundwater seepage into foundation and utility excavations is generally not anticipated to pose a problem during construction. However, if localized ponding of groundwater does occur, we anticipate standard sump pit and pumping procedures should be adequate to control such seepage.

The contractor must provide a safely sloped excavation or an adequately constructed and braced shoring system in accordance with federal, state and local safety regulations for individuals working in an excavation that may expose them to the danger of moving ground. If material is stored or heavy equipment is operated near an excavation, stronger shoring must be used to resist the extra pressure due to the superimposed loads.

The contractor should take precautions to protect adjacent utilities, roadways and structures during construction.

### **5. GENERAL COMMENTS**

#### **Basis of Geotechnical Report**

This report has been prepared in accordance with generally accepted geotechnical engineering practices to assist in the design of this project. If the site plan or the project design criteria differ are changed, the conclusions and recommendations contained in this report are not be considered valid unless the variations are reviewed, and the conclusions of this report are modified or approved in writing by our office.

The discussions and recommendations submitted in this report are based on the available project information, described in this report, and the data obtained from the seven soil borings performed at the approximate locations indicated on the appended location plan. This report does not reflect variations which may occur between or away from the soil borings. The nature and extent of the variations may not become evident until the time of construction. If significant variations become evident, it may be necessary for us to reevaluate the recommendations of this report.

In the process of obtaining and testing samples and preparing this report, procedures are followed that represent reasonable and accepted practice in the field of soil and foundation engineering. Specifically, field logs are prepared during the drilling and sampling operations that describe field occurrences, sampling locations, and other information. Samples obtained in the field are frequently subjected to additional testing and reclassification in the laboratory and differences may exist between the field logs and the





report logs. The engineer preparing the report reviews the field logs, laboratory classifications, and test data and then prepares the report logs. Our recommendations are based on the contents of the report logs and the information contained therein.

#### **Design, Plan and Specification Review**

As part of our continued service to the project, we should be retained to review the design details, project plans and specifications to verify the project factors affecting foundation performance are consistent with the design recommendations set forth in this report.

#### **Field Verification of Geotechnical Conditions**

The site earthwork operations should be observed by SME to verify subgrade soils are suitable for placement of engineered fill and to verify engineered fill is properly placed and compacted. The foundation construction activities should be observed by SME, and the foundation bearing soils/materials tested by SME to verify conditions are as anticipated. As geotechnical engineer of record, SME is well suited to verify the recommendations of this report are properly incorporated in the design of this project, and properly implemented during construction.

#### **Project Information for Contractor**

This report and any further addenda or reports should be made available to bidders prior to submitting their proposals and to the successful contractor and subcontractors for their information only and to supply them with facts relative to the subsurface evaluation and laboratory test results. When conditions, differing from those presented in this report, are encountered, the contractor should promptly notify the owner verbally to verify conditions by the geotechnical engineer and describe the nature and extent of the differing conditions in writing. We recommend the construction contract include provisions for dealing with differing conditions and contingency funds should be reserved for potential problems during earthwork and foundation construction. We would be pleased to assist you in the contract provisions based on our experience.

Furthermore, the contractor should provide for environmental conditions at this site which may affect the excavation, removal, or disposal of soil, dewatering of excavations, and health and safety of workers. Any environmental assessment reports prepared for this property should be made available for review by bidders and the successful contractor.



## APPENDIX A

1. IMPORTANT INFORMATION ABOUT  
YOUR GEOTECHNICAL ENGINEERING REPORT
2. SOIL BORING LOCATION DIAGRAM
3. GENERAL NOTES
4. UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
5. SOIL BORING LOGS (B1 THROUGH B7)





# Important Information About Your Geotechnical Engineering Report

*Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.*

*The following information is provided to help you manage your risks.*

## Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you—should apply the report for any purpose or project except the one originally contemplated.*

## A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report that was:*

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,

- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

## Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

## Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.



### **A Report's Recommendations Are *Not* Final**

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

### **A Geotechnical Engineering Report Is Subject To Misinterpretation**

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

### **Do Not Redraw the Engineer's Logs**

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

### **Give Contractors a Complete Report and Guidance**

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the

report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time to perform additional study.* Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

### **Read Responsibility Provisions Closely**

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

### **Geoenvironmental Concerns Are Not Covered**

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any *geoenvironmental* findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own *geoenvironmental* information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

### **Rely on Your Geotechnical Engineer for Additional Assistance**

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

**ASFE** PROFESSIONAL  
FIRMS PRACTICING  
IN THE GEOSCIENCES

8811 Colesville Road Suite G106 Silver Spring, MD 20910

Telephone: 301-565-2733 Facsimile: 301-589-2017

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IIGER06983.5M















# general notes

## Drilling and Sampling Symbols

- Split-Spoon-1 3/8" I.D., 2" O.D. except where noted
- Liner Sample
- Power Auger Sample
- Shelby Tube-2" O.D., except where noted
- Piston Sample-3" diameter
- Wash Sample
- Hand Auger Sample
- Bag or Bottle Sample
- Continuous Sampler

- NR - No Recovery
- RC - Rock Core with diamond bit. NX size, except where noted
- RB - Rock Bit
- VS - Vane Shear
- PM - Pressuremeter
- GP - Geoprobe
- PID - Photo Ionization Device
- FID - Flame Ionization Device

Standard Penetration 'N' - Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch O.D. split spoon, except where noted (based on ASTM D1586).

## Particle Sizes

- Gravel - Greater than 12 inches (305 mm)
- Coarse - 3 inches (76.2 mm) to 12 inches (305 mm)
- Medium - 3/4 inches (19.05 mm) to 3 inches (76.2 mm)
- Fine - No. 4 (4.75 mm) to 3/4 inches (19.05 mm)
- Very Fine - No. 10 (2.00 mm) to No. 4 (4.75 mm)
- Coarse - No. 40 (0.425 mm) to No. 10 (2.00 mm)
- Medium - No. 200 (0.074 mm) to No. 40 (0.425 mm)
- Fine - (0.005 mm) to (0.074 mm)
- Less than (0.005 mm)

## Depositional Features

- Parting - as much as 1/16 inch (1.6 mm) thick
- Seam - 1/16 inch (1.6 mm) to 1/2 inch (12.7 mm) thick
- Layer - 1/2 inch (12.7 mm) to 12 (305 mm) inch thick
- Stratum - greater than 12 inches (305 mm) thick
- Pocket - small, erratic deposit of limited lateral extent
- Lens - lenticular deposit
- Varved - alternating seams or layers of silt and/or clay and sometimes fine sand
- Occasional - one or less per foot (305 mm) of thickness
- Frequent - more than one per foot (305 mm) of thickness
- Interbedded - applied to strata of soil or beds of rock lying between or alternating with other strata of a different nature

Groundwater levels indicated on the boring logs are the levels measured in the boring at times indicated. The accurate determination of groundwater levels may not be possible with short term observations especially in low permeability soils. The groundwater levels shown may fluctuate throughout the year with variation in precipitation, evaporation, and runoff.

## Classification

### Noncohesive Soils (Blows per foot or 0.3m)

- Loose : 0 to 4
- Medium Dense : 5 to 9
- Dense : 10 to 29
- Very Dense : 30 to 49
- Extremely Dense : 50 to 80
- Over 80

### Cohesive Soils

#### Consistency

- Very Soft : 0.25 kips/ft<sup>2</sup> (12.0 kPa) or less
- Soft : 0.25 to 0.49 kips/ft<sup>2</sup> (12.0 to 23.8 kPa)
- Medium : 0.50 to 0.99 kips/ft<sup>2</sup> (23.9 to 47.7 kPa)
- Stiff : 1.00 to 1.99 kips/ft<sup>2</sup> (47.8 to 95.6 kPa)
- Very Stiff : 2.00 to 3.99 kips/ft<sup>2</sup> (95.7 to 191.3 kPa)
- Hard : 4.00 kips/ft<sup>2</sup> (191.4 kPa) or greater

#### Shear Strength

## Constituents

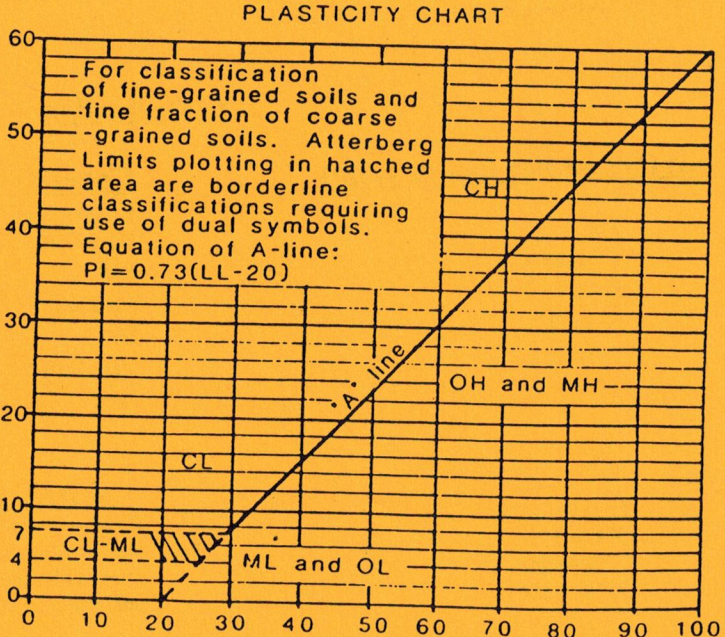
- Less than 5%
- 5% to 12%
- 12% to 25%
- 25% to 50%
- Silty, Clayey, etc.)

## Soil Description

If clay content sufficiently dominates soil properties, then clay becomes the primary noun with the other major soil constituent as modifier : i.e. silty clay. Other minor soil constituents may be added according to estimates of soil constituents present, i.e., silty clay, trace to some sand, trace gravel.



# unified soil classification system

Major divisions		Group symbols	Typical names	Laboratory classification criteria			
Coarse-grained soils (More than half of material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction larger than No. 4 sieve size)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:  Less than 5% . . . . . GW, GP, SW, SP More than 12% . . . . . GM, GC, SM, SC 5 to 12% . . . . . Borderline cases requiring dual symbols	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3		
		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW		
		GM	d		Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			u				
		GC	Clayey gravels, gravel-sand-clay mixtures				
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	
		Clean sands (Little or no fines)	SP		Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW	
		SM	d		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			u				
		SC	Clayey sands, sand-clay mixtures		Atterberg limits above "A" line with P.I. greater than 7		
Fine-grained soils (More than half of material is smaller than No. 200 sieve)	Silts and clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	<div>PLASTICITY CHART</div> <div>For classification of fine-grained soils and fine fraction of coarse-grained soils. Atterberg Limits plotting in hatched area are borderline classifications requiring use of dual symbols. Equation of A-line: <math>PI = 0.73(LL - 20)</math></div> 			
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays				
		OL	Organic silts and organic silty clays of low plasticity				
	Silts and clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts				
		CH	Inorganic clays of high plasticity, fat clays				
		OH	Organic clays of medium to high plasticity, organic silts				
		PI	Peat and other highly organic soils				
	Highly organic soils						

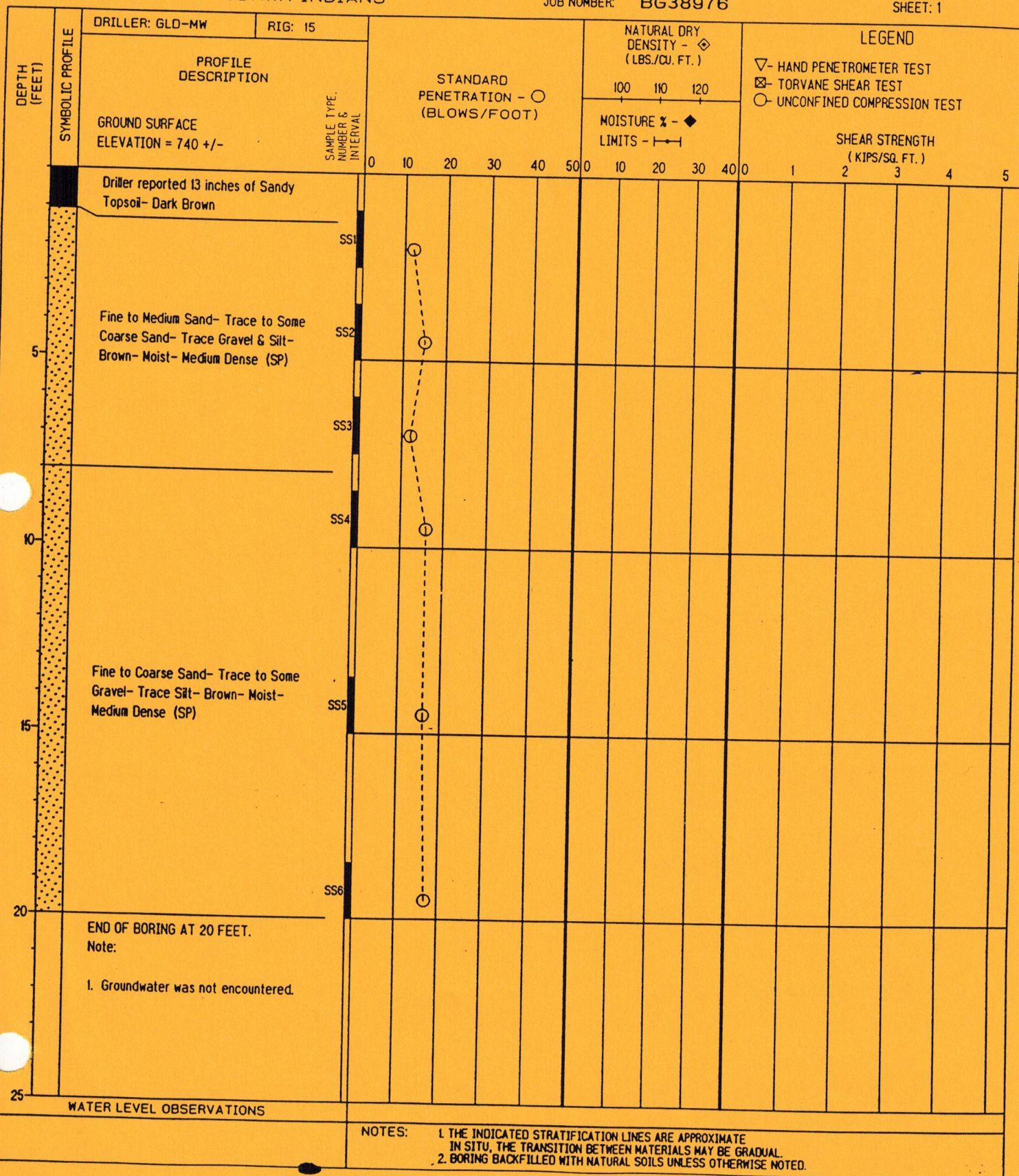


# soil and materials engineers, inc.

B NAME: LTBB ADMINISTRATION BUILDING  
 JOB LOCATION: PETOSKEY, MICHIGAN  
 OWNER: LTBB OF ODAWA INDIANS

A/E: WADE-TRIM, INC.  
 BY: JLN/JWC DATE: 6/5/01  
 JOB NUMBER: BG38976

BORING B1  
 SHEET: 1



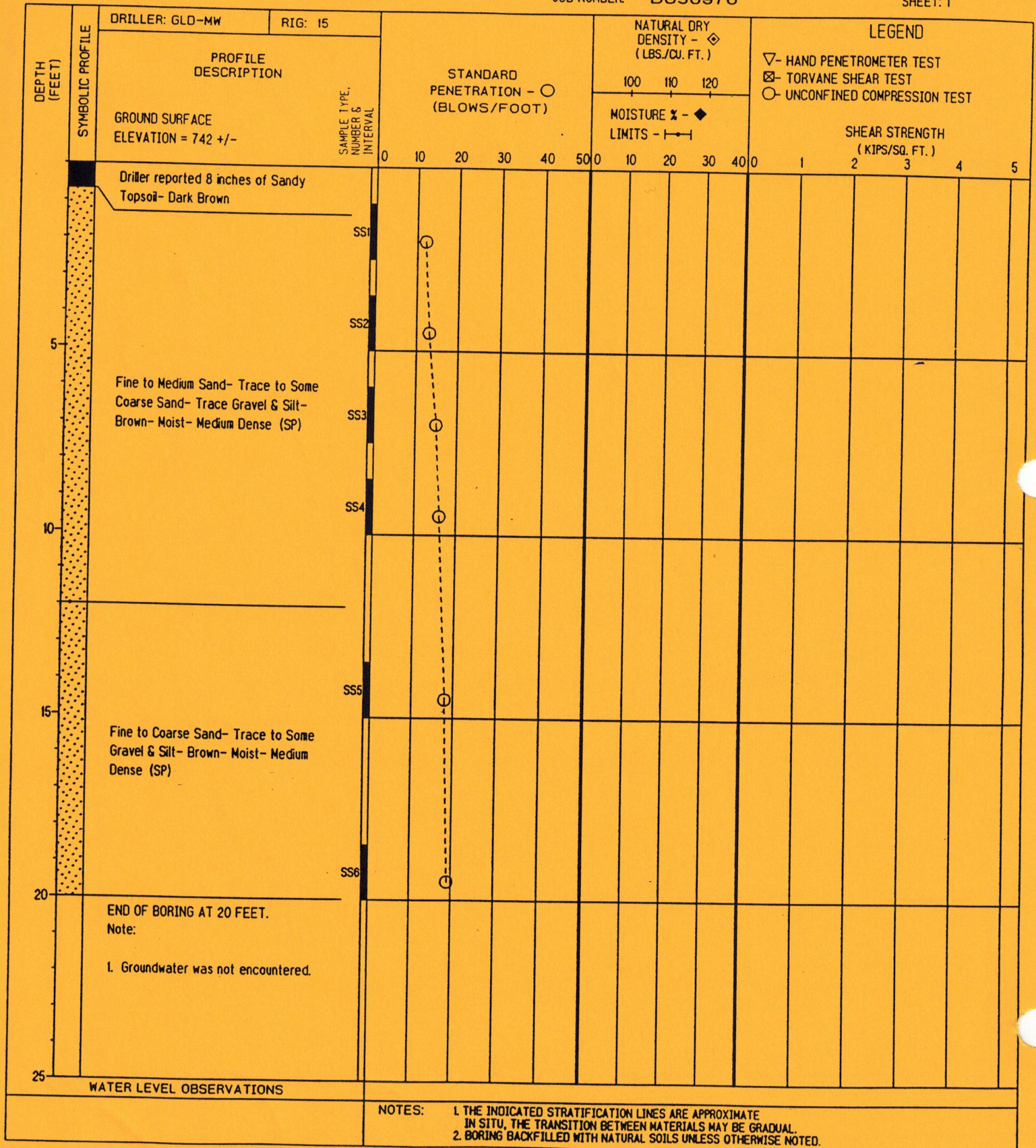


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A/E: WADE-TRIM, INC.  
 BY: JLN/JWC DATE: 6/5/01  
 JOB NUMBER: BG38976

BORING B2  
 SHEET: 1



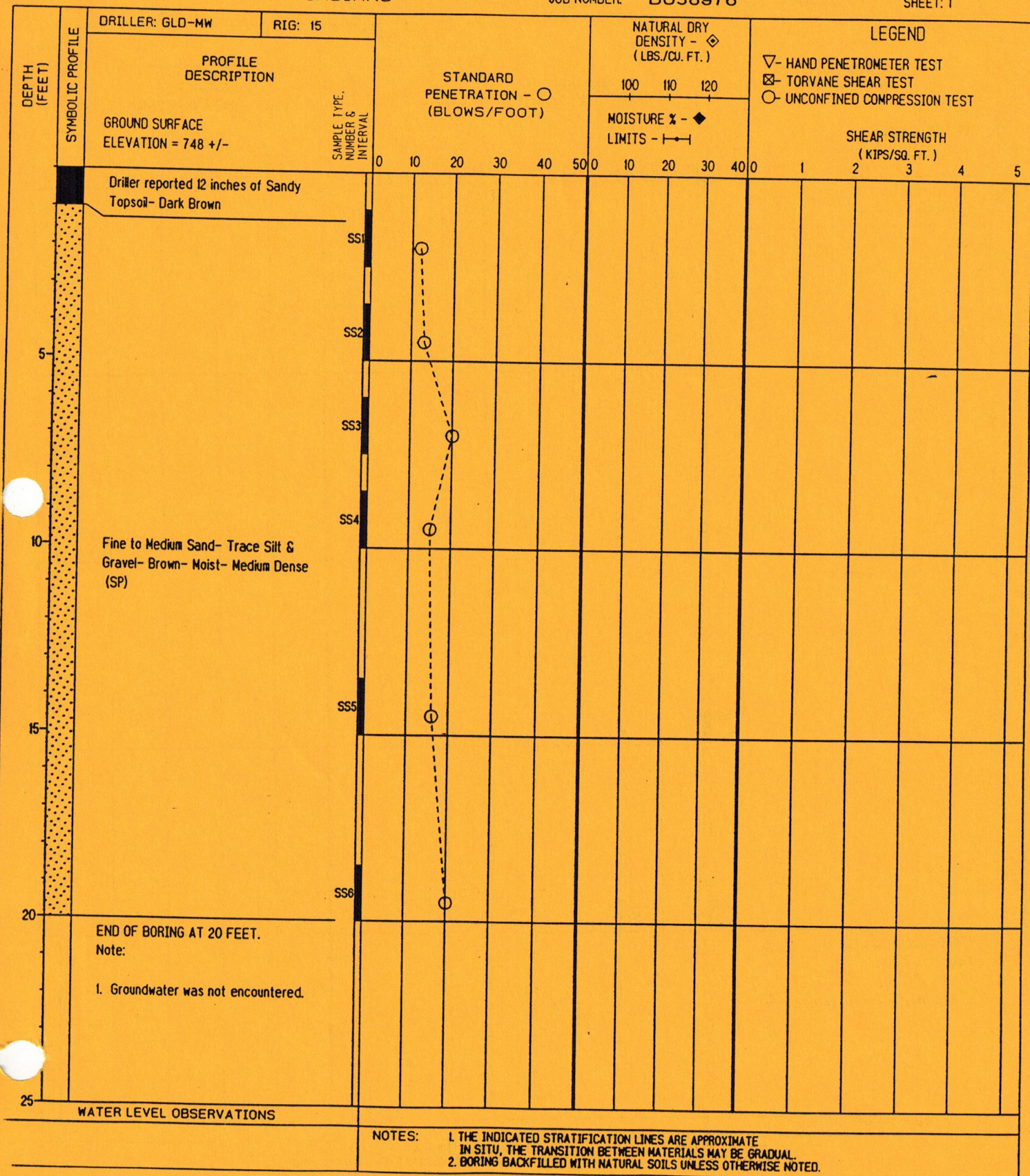


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 JOB LOCATION: PETOSKEY, MICHIGAN  
 OWNER: LTBB OF ODAWA INDIANS

A/E: WADE-TRIM, INC.  
 BY: JLN/JWC DATE: 6/5/01  
 JOB NUMBER: BG38976

BORING B3  
 SHEET: 1



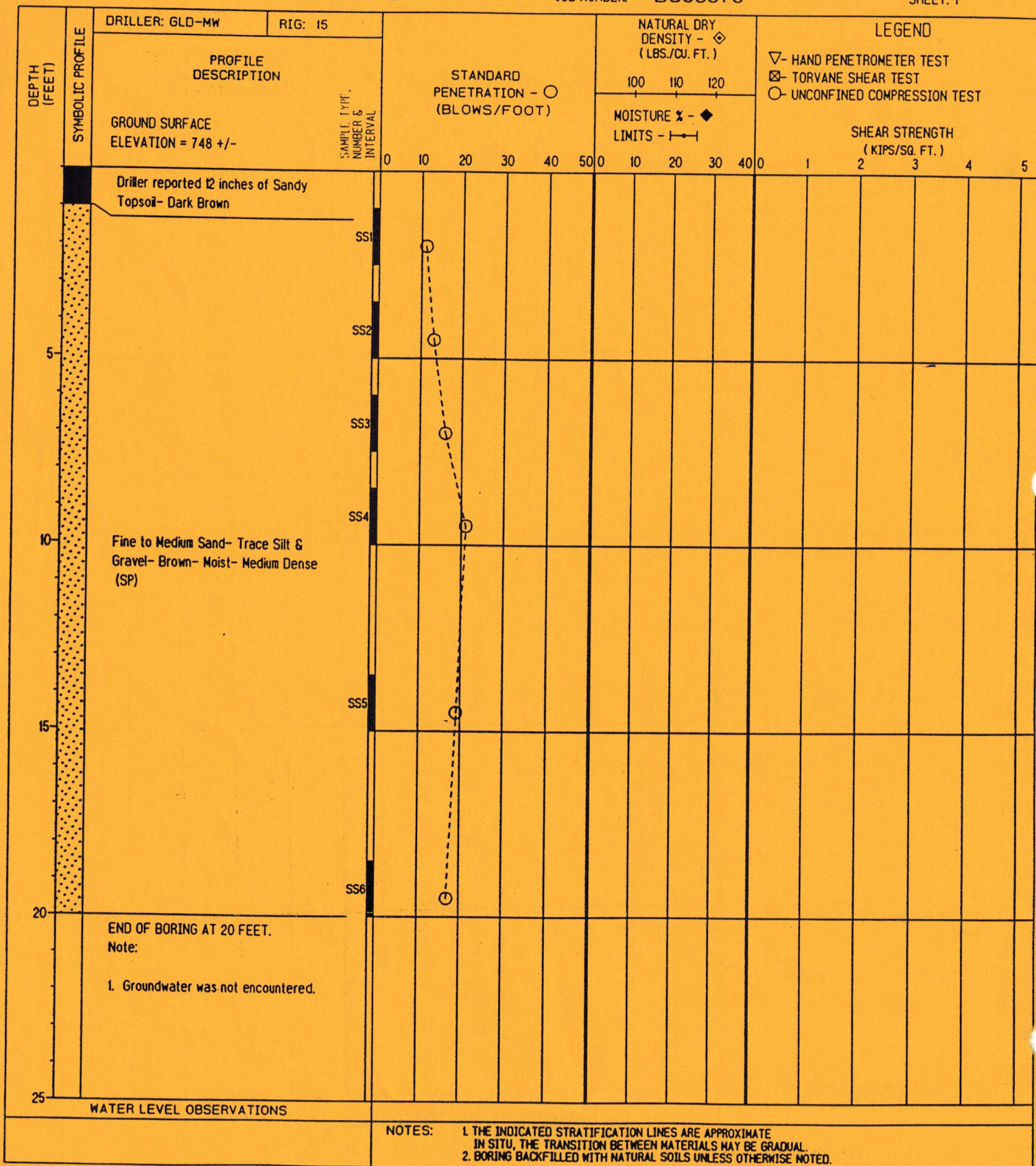


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 JOB LOCATION: PETOSKEY, MICHIGAN  
 OWNER: LTBB OF ODAWA INDIANS

A/E: WADE-TRIM, INC.  
 BY: JLN/JWC DATE: 6/5/01  
 JOB NUMBER: BG38976

BORING B4  
 SHEET: 1



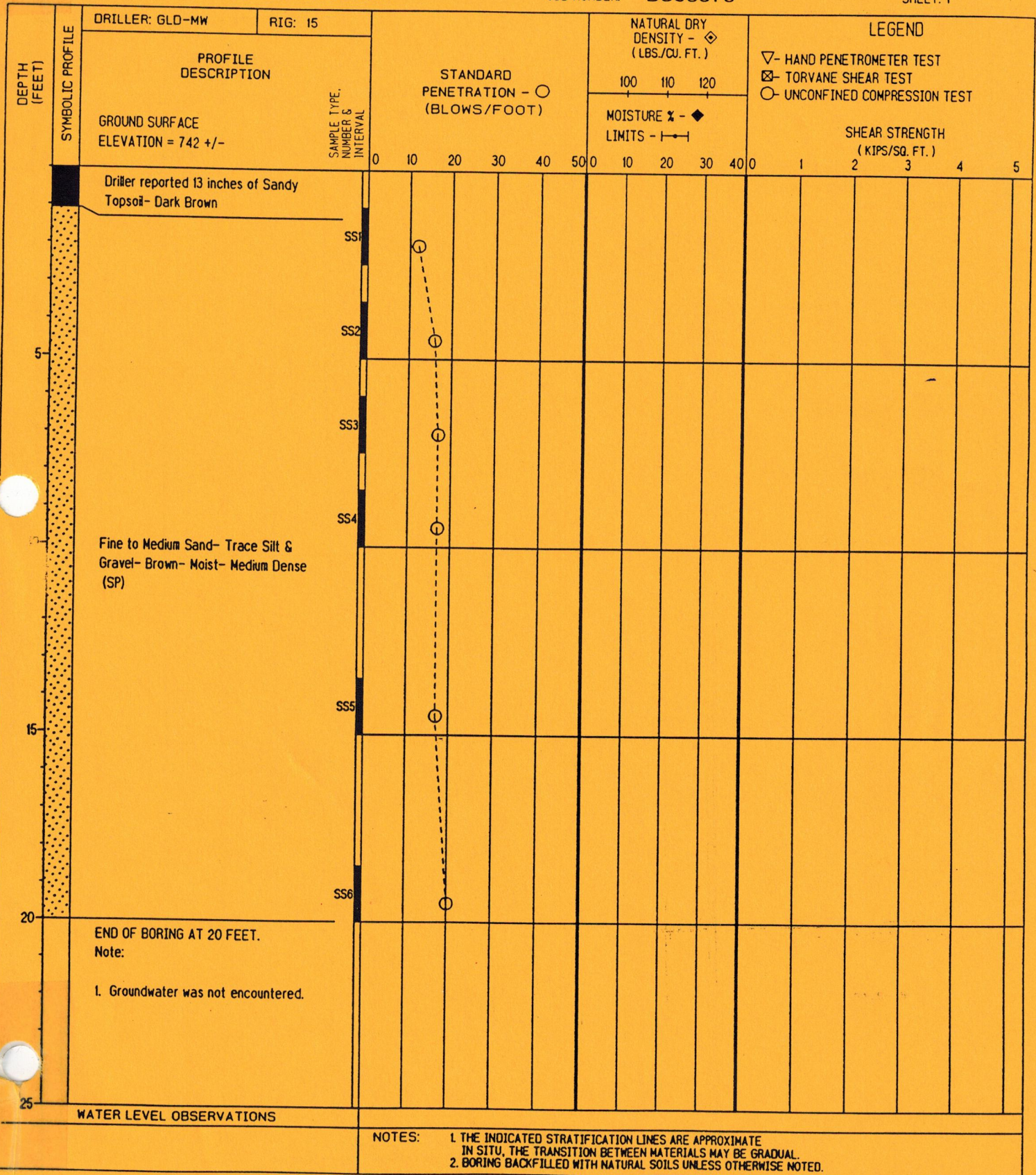


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A/E: WADE-TRIM, INC.  
 BY: JLN/JWC DATE: 6/5/01  
 JOB NUMBER: BG38976

BORING B5  
 SHEET: 1





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 JOB LOCATION: PETOSKEY, MICHIGAN  
 OWNER: LTBB OF ODAWA INDIANS

A/E: WADE-TRIM, INC.  
 BY: JLN/JWC DATE: 6/5/01  
 JOB NUMBER: BG38976

BORING B6  
 SHEET: 1

DEPTH (FEET)	SYMBOLIC PROFILE	DRILLER: GLD-MW	RIG: 15	STANDARD PENETRATION - ○ (BLOWS/FOOT)	NATURAL DRY DENSITY - ◇ (LBS./CU. FT.)	LEGEND		
		PROFILE DESCRIPTION			100	110	120	▽- HAND PENETROMETER TEST
					MOISTURE % - ◆ LIMITS - —+—		☒- TORVANE SHEAR TEST	
		GROUND SURFACE ELEVATION = 748 +/-					○- UNCONFINED COMPRESSION TEST	
							SHEAR STRENGTH (KIPS/SQ. FT.)	
				0 10 20 30 40 50	0 10 20 30 40	0 1 2 3 4 5		
		Driller reported 14 inches of Sandy Topsoil- Dark Brown						
		Fine to Medium Sand- Trace Silt & Gravel- Brown- Moist- Medium Dense (SP)						
5								
		END OF BORING AT 6 FEET. Note: 1. Groundwater was not encountered.						
10								
15								
20								
25								
WATER LEVEL OBSERVATIONS								
NOTES:				1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU, THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL. 2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.				



# soil and materials engineers, inc.

NAME: LTBB ADMINISTRATION BUILDING  
 JOB LOCATION: PETOSKEY, MICHIGAN  
 OWNER: LTBB OF ODAWA INDIANS

A/E: WADE-TRIM, INC.  
 BY: JLN/JWC DATE: 6/5/01 BORING B7  
 JOB NUMBER: BG38976 SHEET: 1

DEPTH (FEET)	SYMBOLIC PROFILE	DRILLER: GLD-MW	RIG: 15	PROFILE DESCRIPTION	SAMPLE TYPE, NUMBER & INTERVAL	STANDARD PENETRATION - ○ (BLOWS/FOOT)	NATURAL DRY DENSITY - ◇ (LBS./CU. FT.)		MOISTURE % - ◆ LIMITS - —+—		LEGEND				
		100 110 120					0 10 20 30 40		▽- HAND PENETROMETER TEST ☒- TORVANE SHEAR TEST ○- UNCONFINED COMPRESSION TEST	SHEAR STRENGTH (KIPS/SQ. FT.)					
				GROUND SURFACE ELEVATION = 740 +/-		0 10 20 30 40 50	0 10 20 30 40	0 10 20 30 40	0 1 2 3 4 5						
		Driller reported 12 inches of Sandy Topsoil- Dark Brown													
			SS1												
			SS2	Fine to Medium Sand- Trace Silt & Gravel- Brown- Moist- Medium Dense (SP)											
5			SS3												
		END OF BORING AT 6 FEET. Note: 1. Groundwater was not encountered.													
10															
15															
20															
25		WATER LEVEL OBSERVATIONS													

NOTES: 1. THE INDICATED STRATIFICATION LINES ARE APPROXIMATE IN SITU. THE TRANSITION BETWEEN MATERIALS MAY BE GRADUAL.  
 2. BORING BACKFILLED WITH NATURAL SOILS UNLESS OTHERWISE NOTED.





**DOCUMENT 00 41 13**

**BID FORM - STIPULATED PRICE**

To: LTBB Odawa Indians  
c/o Bryan Gillett, Planning Director  
7500 Odawa Circle  
Harbor Springs, MI 49740

Project: LTBB ODAWA INDIANS  
Government Center Archives Expansion  
AEA Project No. 232-15

Date: \_\_\_\_\_

Submitted by: \_\_\_\_\_  
(full name)

(full address) \_\_\_\_\_  
\_\_\_\_\_

**1.1 OFFER**

Having examined the Place of The Work and all matters referred to in the Instructions to Bidders and the Contract Documents prepared by Anthony Esson, Architect dated February 29, 2016 for the above mentioned project, we, the undersigned, hereby offer to enter into a Contract to perform the Work for the Price of:

\$ \_\_\_\_\_ (numerical)

\$ \_\_\_\_\_ dollars  
(written), in lawful money of the United States of America.

We have included the cost of Performance and Labor/Material Payment Bonds in the Bid.

We have included, the security deposit as required by the Instruction to Bidders.

We have include the cost of Wages and Benefits required under the Davis-Bacon Act.

We have completed and attached Certificates of the Bidder as required in Section 00 21 13:  
Document 00 45 03 - Debarment, Suspension, and Ineligibility Affidavit  
Document 00 45 04 - Non-collusion Affidavit of Bidder  
Form HUD-5369-A (11/92) Representations, Certifications, and Other Statements of Bidders

We have not included Michigan Sales Tax as the project being Tribally Owned is exempt from Michigan Sales Tax under an agreement with the State of Michigan.

## 1.2 ACCEPTANCE

This offer shall be open to acceptance and is irrevocable for sixty days from the bid closing date.

If this bid is accepted by the Owner within the time period stated above, we will:

- Execute the Agreement within seven days of receipt of Notice of Award.
- Furnish the required bonds and insurances within seven days of receipt of Notice of Award.
- Commence work within seven days after execution of the agreement.

If this bid is accepted within the time stated, and we fail to commence the Work or we fail to provide the required bonds, the security deposit shall be forfeited as compensation to the Owner for Owners additional expenses, by reason of our failure.

In the event our bid is not accepted within the time stated above, the required security deposit will be returned to the undersigned, in accordance with the provisions of the Instructions to Bidders; unless a mutually satisfactory arrangement is made for its retention and validity for an extended period of time.

## 1.3 CONTRACT TIME

We acknowledge that construction must be Substantially Complete and approved for occupancy not later than September 30, 2016, and that we must achieve Final Completion not later than November 30, 2016. We further acknowledge that Liquidated Damages as defined in the Contract Documents apply to both Substantial Completion and Final Completion.

## 1.4 ADDENDA

The following Addenda have been received. The modifications to the Bid Documents noted below have been considered and all costs are included in the Bid Price.

Addendum # \_\_\_\_\_ Dated \_\_\_\_\_

Addendum # \_\_\_\_\_ Dated \_\_\_\_\_

## 1.5 APPENDICES

In accordance with Instruction to Bidders, the following documents will be submitted within 24 hours of bid opening and made a condition of the Bid:

- Bidder's qualifications statement and supporting data (if requested by the Owner).
- List of Subcontractors (if requested by the Owner).

1.6 BID FORM SIGNATURES

\_\_\_\_\_  
Bidder - print the full name of your firm

\_\_\_\_\_  
Authorized signing officer

\_\_\_\_\_  
Title

\_\_\_\_\_  
Signature

If the Bidder is a joint venture or partnership, add additional forms of execution for each member of the joint venture or partnership in the appropriate form or forms as above.

**END OF DOCUMENT**

**DOCUMENT 00 45 03**

**DEBARMENT, SUSPENSION, and INELIGIBILITY AFFIDAVIT**

By signing and submitting this affidavit, Bidder certifies that neither it nor its principals are presently debarred, suspended, proposed for debarment, declared ineligible, or excluded from receiving Federal contracts, certain subcontracts, and certain Federal financial and nonfinancial assistance and benefits, pursuant to the provisions of 31 U.S.C. 6101, note, E.O. 12549, E.O. 12689, 48 CFR 9.404, and each agency's codification of the Common Rule for Nonprocurement suspension and debarment.

BIDDER:

\_\_\_\_\_

By: \_\_\_\_\_

Its: \_\_\_\_\_

State of Michigan       )  
                                  ) SS  
County of                )

This instrument was acknowledged before me on the \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_, by

\_\_\_\_\_.

\_\_\_\_\_  
, Notary Public

\_\_\_\_\_, County, Michigan

My Commission Expires: \_\_\_\_\_

Acting in the County of: \_\_\_\_\_

**END OF DEBARMENT, SUSPENSION, and INELIGIBILITY AFFIDAVIT**



**DOCUMENT 00 45 04**

**NON-COLLUSION AFFIDAVIT OF BIDDER**

\_\_\_\_\_, being the first duly sworn, deposes and says that:

1. He/she is \_\_\_\_\_ of \_\_\_\_\_  
(Owner, partner, etc.) (Company)  
the Bidder that has submitted the accompanying Bid;

2. He/she is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

3. Such Bid is genuine and is not a collusive or sham Bid;

4. Neither the said Bidder nor any of its officers, partners, owners, subcontractors, agents, representatives, employees or parties in interest including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, firm or person to submit a sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly sought by agreement or collusion or communication or conference with any other Bidder, firm or person to fix price or prices in the attached Bid or of any other Bidder, or to fix overhead, profit or cost element of the bid price or the bid price of any other bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement and advantage against the owner of the property interested in the proposed contract;

5. No agents, representatives, or employees of the Little Traverse Bay Bands of Odawa Indians is directly or indirectly interested in the bid, or the work to which it relates, or in any portion of the profits thereof; and,

6. The price of prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees or parties in interest including this affiant;

7. The Bidder is not indebted to the Little Traverse Bay Bands of Odawa Indians in any form or manner.

By: \_\_\_\_\_

Its: \_\_\_\_\_

State of Michigan            )  
  ) SS  
County of                    )

This instrument was acknowledged before me on the \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_, by

\_\_\_\_\_.

\_\_\_\_\_, Notary Public

\_\_\_\_\_, County, Michigan

My Commission Expires: \_\_\_\_\_

Acting in the County of: \_\_\_\_\_



**U.S. Department of Housing  
and Urban Development**  
Office of Public and Indian Housing

**Representations, Certifications,  
and Other Statements of Bidders**  
**Public and Indian Housing Programs**



# Representations, Certifications, and Other Statements of Bidders

## Public and Indian Housing Programs

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9. Certification of Eligibility Under the Davis-Bacon Act	3
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13. Bidder's Signature	3

### 1. Certificate of Independent Price Determination

#### (a) The bidder certifies that--

(1) The prices in this bid have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other bidder or competitor relating to (i) those prices, (ii) the intention to submit a bid, or (iii) the methods or factors used to calculate the prices offered;

(2) The prices in this bid have not been and will not be knowingly disclosed by the bidder, directly or indirectly, to any other bidder or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a competitive proposal solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the bidder to induce any other concern to submit or not to submit a bid for the purpose of restricting competition.

(b) Each signature on the bid is considered to be a certification by the signatory that the signatory--

(1) Is the person in the bidder's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above; or

(2) (i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

[insert full name of person(s) in the bidder's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the bidder's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) above have not participated, and will not participate, in any action contrary to subparagraphs (a)(1) through (a)(3) above; and

(iii) As an agent, has not personally participated, and will not participate in any action contrary to subparagraphs (a)(1) through (a)(3) above.

(c) If the bidder deletes or modifies subparagraph (a)2 above, the bidder must furnish with its bid a signed statement setting forth in detail the circumstances of the disclosure.

[ ] [Contracting Officer check if following paragraph is applicable]

(d) Non-collusive affidavit. (applicable to contracts for construction and equipment exceeding \$50,000)

(1) Each bidder shall execute, in the form provided by the PHA/IHA, an affidavit to the effect that he/she has not colluded with any other person, firm or corporation in regard to any bid submitted in response to this solicitation. If the successful bidder did not submit the affidavit with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the affidavit by that date may render the bid nonresponsive. No contract award will be made without a properly executed affidavit.

(2) A fully executed "Non-collusive Affidavit" [ ] is, [ ] is not included with the bid.

### 2. Contingent Fee Representation and Agreement

#### (a) Definitions. As used in this provision:

"Bona fide employee" means a person, employed by a bidder and subject to the bidder's supervision and control as to time, place, and manner of performance, who neither exerts, nor proposes to exert improper influence to solicit or obtain contracts nor holds out as being able to obtain any contract(s) through improper influence.

"Improper influence" means any influence that induces or tends to induce a PHA/IHA employee or officer to give consideration or to act regarding a PHA/IHA contract on any basis other than the merits of the matter.

(b) The bidder represents and certifies as part of its bid that, except for full-time bona fide employees working solely for the bidder, the bidder:

(1) [ ] has, [ ] has not employed or retained any person or company to solicit or obtain this contract; and

(2) [ ] has, [ ] has not paid or agreed to pay to any person or company employed or retained to solicit or obtain this contract any commission, percentage, brokerage, or other fee contingent upon or resulting from the award of this contract.

(c) If the answer to either (a)(1) or (a)(2) above is affirmative, the bidder shall make an immediate and full written disclosure to the PHA/IHA Contracting Officer.

(d) Any misrepresentation by the bidder shall give the PHA/IHA the right to (1) terminate the contract; (2) at its discretion, deduct from contract payments the amount of any commission, percentage, brokerage, or other contingent fee; or (3) take other remedy pursuant to the contract.

### 3. Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions (applicable to contracts exceeding \$100,000)

(a) The definitions and prohibitions contained in Section 1352 of title 31, United States Code, are hereby incorporated by reference in paragraph (b) of this certification.



(b) The bidder, by signing its bid, hereby certifies to the best of his or her knowledge and belief as of December 23, 1989 that:

(1) No Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with the awarding of a contract resulting from this solicitation;

(2) If any funds other than Federal appropriated funds (including profit or fee received under a covered Federal transaction) have been paid, or will be paid, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress on his or her behalf in connection with this solicitation, the bidder shall complete and submit, with its bid, OMB standard form LLL, "Disclosure of Lobbying Activities;" and

(3) He or she will include the language of this certification in all subcontracts at any tier and require that all recipients of subcontract awards in excess of \$100,000 shall certify and disclose accordingly.

(c) Submission of this certification and disclosure is a prerequisite for making or entering into this contract imposed by section 1352, title 31, United States Code. Any person who makes an expenditure prohibited under this provision or who fails to file or amend the disclosure form to be filed or amended by this provision, shall be subject to a civil penalty of not less than \$10,000, and not more than \$100,000, for each such failure.

(d) Indian tribes (except those chartered by States) and Indian organizations as defined in section 4 of the Indian Self-Determination and Education Assistance Act (25 U.S.C. 450B) are exempt from the requirements of this provision.

#### **4. Organizational Conflicts of Interest Certification**

The bidder certifies that to the best of its knowledge and belief and except as otherwise disclosed, he or she does not have any organizational conflict of interest which is defined as a situation in which the nature of work to be performed under this proposed contract and the bidder's organizational, financial, contractual, or other interests may, without some restriction on future activities:

- (a) Result in an unfair competitive advantage to the bidder; or,
- (b) Impair the bidder's objectivity in performing the contract work.

[ ] In the absence of any actual or apparent conflict, I hereby certify that to the best of my knowledge and belief, no actual or apparent conflict of interest exists with regard to my possible performance of this procurement.

#### **5. Bidder's Certification of Eligibility**

(a) By the submission of this bid, the bidder certifies that to the best of its knowledge and belief, neither it, nor any person or firm which has an interest in the bidder's firm, nor any of the bidder's subcontractors, is ineligible to:

(1) Be awarded contracts by any agency of the United States Government, HUD, or the State in which this contract is to be performed; or,

(2) Participate in HUD programs pursuant to 24 CFR Part 24.

(b) The certification in paragraph (a) above is a material representation of fact upon which reliance was placed when making award. If it is later determined that the bidder knowingly rendered an erroneous certification, the contract may be terminated for default, and the bidder may be debarred or suspended from participation in HUD programs and other Federal contract programs.

#### **6. Minimum Bid Acceptance Period**

(a) "Acceptance period," as used in this provision, means the number of calendar days available to the PHA/IHA for awarding a contract from the date specified in this solicitation for receipt of bids.

(b) This provision supersedes any language pertaining to the acceptance period that may appear elsewhere in this solicitation.

(c) The PHA/IHA requires a minimum acceptance period of [Contracting Officer insert time period] calendar days.

(d) In the space provided immediately below, bidders may specify a longer acceptance period than the PHA's/IHA's minimum requirement. The bidder allows the following acceptance period: calendar days.

(e) A bid allowing less than the PHA's/IHA's minimum acceptance period will be rejected.

(f) The bidder agrees to execute all that it has undertaken to do, in compliance with its bid, if that bid is accepted in writing within (1) the acceptance period stated in paragraph (c) above or (2) any longer acceptance period stated in paragraph (d) above.

#### **7. Small, Minority, Women-Owned Business Concern Representation**

The bidder represents and certifies as part of its bid/ offer that it --

(a) [ ] is, [ ] is not a small business concern. "Small business concern," as used in this provision, means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding, and qualified as a small business under the criteria and size standards in 13 CFR 121.

(b) [ ] is, [ ] is not a women-owned business enterprise. "Women-owned business enterprise," as used in this provision, means a business that is at least 51 percent owned by a woman or women who are U.S. citizens and who also control and operate the business.

(c) [ ] is, [ ] is not a minority business enterprise. "Minority business enterprise," as used in this provision, means a business which is at least 51 percent owned or controlled by one or more minority group members or, in the case of a publicly owned business, at least 51 percent of its voting stock is owned by one or more minority group members, and whose management and daily operations are controlled by one or more such individuals. For the purpose of this definition, minority group members are:

(Check the block applicable to you)

- |                        |                              |
|------------------------|------------------------------|
| [ ] Black Americans    | [ ] Asian Pacific Americans  |
| [ ] Hispanic Americans | [ ] Asian Indian Americans   |
| [ ] Native Americans   | [ ] Hasidic Jewish Americans |

#### **8. Indian-Owned Economic Enterprise and Indian Organization Representation** (applicable only if this solicitation is for a contract to be performed on a project for an Indian Housing Authority)

The bidder represents and certifies that it:

(a) [ ] is, [ ] is not an Indian-owned economic enterprise. "Economic enterprise," as used in this provision, means any commercial, industrial, or business activity established or organized for the purpose of profit, which is at least 51 percent Indian owned. "Indian," as used in this provision, means any person who is a member of any tribe, band, group, pueblo, or community which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs and any "Native" as defined in the Alaska Native Claims Settlement Act.

(b) [ ] is, [ ] is not an Indian organization. "Indian organization," as used in this provision, means the governing body of any Indian tribe or entity established or recognized by such governing body. Indian "tribe" means any Indian tribe, band, group, pueblo, or



community including Native villages and Native groups (including corporations organized by Kenai, Juneau, Sitka, and Kodiak) as defined in the Alaska Native Claims Settlement Act, which is recognized by the Federal Government as eligible for services from the Bureau of Indian Affairs.

**9. Certification of Eligibility Under the Davis-Bacon Act** (applicable to construction contracts exceeding \$2,000)

(a) By the submission of this bid, the bidder certifies that neither it nor any person or firm who has an interest in the bidder's firm is a person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(b) No part of the contract resulting from this solicitation shall be subcontracted to any person or firm ineligible to be awarded contracts by the United States Government by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(c) The penalty for making false statements is prescribed in the U. S. Criminal Code, 18 U.S.C. 1001.

**10. Certification of Nonsegregated Facilities** (applicable to contracts exceeding \$10,000)

(a) The bidder's attention is called to the clause entitled **Equal Employment Opportunity** of the General Conditions of the Contract for Construction.

(b) "Segregated facilities," as used in this provision, means any waiting rooms, work areas, rest rooms and wash rooms, restaurants and other eating areas, time clocks, locker rooms and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing facilities provided for employees, that are segregated by explicit directive or are in fact segregated on the basis of race, color, religion, or national origin because of habit, local custom, or otherwise.

(c) By the submission of this bid, the bidder certifies that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments, and that it does not and will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The bidder agrees that a breach of this certification is a violation of the Equal Employment Opportunity clause in the contract.

(d) The bidder further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) prior to entering into subcontracts which exceed \$10,000 and are not exempt from the requirements of the Equal Employment Opportunity clause, it will:

(1) Obtain identical certifications from the proposed subcontractors;

(2) Retain the certifications in its files; and

(3) Forward the following notice to the proposed subcontractors (except if the proposed subcontractors have submitted identical certifications for specific time periods):

**Notice to Prospective Subcontractors of Requirement for Certifications of Nonsegregated Facilities**

A Certification of Nonsegregated Facilities must be submitted before the award of a subcontract exceeding \$10,000 which is not exempt from the provisions of the Equal Employment Opportunity clause of the prime contract. The certification may be submitted either for each subcontract or for all subcontracts during a period (i.e., quarterly, semiannually, or annually).

**Note:** The penalty for making false statements in bids is prescribed in 18 U.S.C. 1001.

**11. Clean Air and Water Certification** (applicable to contracts exceeding \$100,000)

The bidder certifies that:

(a) Any facility to be used in the performance of this contract [ ] is, [ ] is not listed on the Environmental Protection Agency List of Violating Facilities:

(b) The bidder will immediately notify the PHA/IHA Contracting Officer, before award, of the receipt of any communication from the Administrator, or a designee, of the Environmental Protection Agency, indicating that any facility that the bidder proposes to use for the performance of the contract is under consideration to be listed on the EPA List of Violating Facilities; and,

(c) The bidder will include a certification substantially the same as this certification, including this paragraph (c), in every nonexempt subcontract.

**12. Previous Participation Certificate** (applicable to construction and equipment contracts exceeding \$50,000)

(a) The bidder shall complete and submit with his/her bid the Form HUD-2530, "Previous Participation Certificate." If the successful bidder does not submit the certificate with his/her bid, he/she must submit it within three (3) working days of bid opening. Failure to submit the certificate by that date may render the bid nonresponsive. No contract award will be made without a properly executed certificate.

(b) A fully executed "Previous Participation Certificate" [ ] is, [ ] is not included with the bid.

**13. Bidder's Signature**

The bidder hereby certifies that the information contained in these certifications and representations is accurate, complete, and current.

\_\_\_\_\_  
(Signature and Date)

\_\_\_\_\_  
(Typed or Printed Name)

\_\_\_\_\_  
(Title)

\_\_\_\_\_  
(Company Name)

\_\_\_\_\_  
(Company Address)



**DOCUMENT 00 52 14**

**AGREEMENT FORM - AIA STIPULATED SUM (SINGLE-PRIME CONTRACT)**

**1.1 SUMMARY**

A. Document Includes:

1. Agreement.

B. Related Documents:

1. Document 00 72 14 - General Conditions - AIA Stipulated Sum (Single-Prime Contract).

**1.2 AGREEMENT**

- A. AIA Document A101-2007, Standard Form of Agreement Between Owner and Contractor Where the Basis of Payment is a Stipulated Sum, as modified and included herein, forms the basis of Agreement between the Owner and Contractor.

**END OF DOCUMENT**





# AIA® Document A101™ – 2007

## **Standard Form of Agreement Between Owner and Contractor** where the basis of payment is a Stipulated Sum

**AGREEMENT** made as of the      day of      in the year Two Thousand Sixteen  
(In words, indicate day, month and year.)

**BETWEEN** the Owner:  
(Name, legal status, address and other information)

LTBB Odawa Indians  
7500 Odawa Circle  
Harbor Springs, MI 49740  
Telephone Number: 231.242.1400

and the Contractor:  
(Name, legal status, address and other information)

Telephone Number:

for the following Project:  
(Name, location and detailed description)

LTBB Odawa Indians Governmental Center Archives Expansion  
7500 Odawa Circle, Harbor Springs, MI 49740

The Architect:  
(Name, legal status, address and other information)

Anthony Esson, Architect  
PO Box 479  
Gaylord, MI 49734  
Telephone Number: 989.732.0585

The Owner and Contractor agree as follows.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

AIA Document A201™–2007, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.



## TABLE OF ARTICLES

1	THE CONTRACT DOCUMENTS
2	THE WORK OF THIS CONTRACT
3	DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION
4	CONTRACT SUM
5	PAYMENTS
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7	TERMINATION OR SUSPENSION
8	MISCELLANEOUS PROVISIONS
9	ENUMERATION OF CONTRACT DOCUMENTS
10	INSURANCE AND BONDS

### ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

### ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

### ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be the date of this Agreement unless a different date is stated below or provision is made for the date to be fixed in a notice to proceed issued by the Owner.

*(Insert the date of commencement if it differs from the date of this Agreement or, if applicable, state that the date will be fixed in a notice to proceed.)*

~~If, prior to the commencement of the Work, the Owner requires time to file mortgages and other security interests, the Owner's time requirement shall be as follows:~~

§ 3.2 The Contract Time shall be measured from the date of commencement.

§ 3.3 The Contractor shall achieve Substantial Completion of the entire Work ~~not later than~~ ( ) days from the ~~date of commencement, or as follows:~~

~~(Insert number of calendar days. Alternatively, a calendar date may be used when coordinated with the date of commencement. If appropriate, insert requirements for earlier Substantial Completion of certain portions of the Work.)~~



## Portion of Work

## Substantial Completion Date

~~subject to adjustments~~

Contractor shall achieve Substantial Completion of the Work not later than May 15, 2016, subject to adjustments in of this Contract Time as provided in the Contract Documents.

*(Insert provisions, if any, for liquidated damages relating to failure to achieve Substantial Completion on time or for bonus payments for early completion of the Work.)*

)

Liquidated Damages: Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not Substantially Complete and approved for occupancy by applicable Governing Authorities within the time agreed upon, plus any extensions of time as allowed by the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal proceeding the actual loss suffered by the Owner if the Work is not Substantially Complete on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as penalty) Contractor shall pay the Owner Five Hundred Dollars (\$500) for each day that expires after the specified date of Substantial Completion until the Work is Substantially Complete. Liquidated Damages charges shall be deducted from the Contractor's progress payment. The Owner reserves the right to demand legal proceedings should the actual loss exceed the damages provided herein.

## ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$ ), subject to additions and deductions as provided in the Contract Documents.

§ 4.2 The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner:

*(State the numbers or other identification of accepted alternates. If the bidding or proposal documents permit the Owner to accept other alternates subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)*

None

§ 4.3 Unit prices, if any:

*(Identify and state the unit price; state quantity limitations, if any, to which the unit price will be applicable.)*

Item  
None

Units and Limitations

Price Per Unit (\$0.00)

§ 4.4 Allowances included in the Contract Sum, if any:

*(Identify allowance and state exclusions, if any, from the allowance price.)*

Item  
Sheet Carpeting Material

Price  
\$18.00 per square yard

## ARTICLE 5 PAYMENTS

### § 5.1 PROGRESS PAYMENTS

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

Init.



§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the ~~month, or as follows:~~month.

§ 5.1.3 Provided that ~~an~~ a properly executed Application for Payment supporting documentation is received by the Architect not later than the last day of a month, the Owner shall make payment of the certified amount to the Contractor not later than the last day of the following month. If an Application for Payment is received by the Architect after the application date fixed above, or if the Application for payment is improperly executed or does not including required supporting documentation, payment shall be made by the Owner not later than thirty ( 30 ) days after the Architect receives the ~~Application for Payment.~~properly executed Application for Payment and supporting documentation.  
(Federal, state or local laws may require payment within a certain period of time.)

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

- .1 Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of ten percent ( 10 %). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 7.3.9 of AIA Document A201™–2007, General Conditions of the Contract for Construction;
  - .2 Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), less retainage of ten percent ( 10 %);
  - .3 Subtract the aggregate of previous payments made by the Owner; and
  - .4 Subtract amounts, if any, for which the Architect has withheld or nullified a Certificate for Payment as provided in Section 9.5 of AIA Document A201–2007.
- .1

§ 5.1.7 The progress payment amount determined in accordance with Section 5.1.6 shall be further modified under the following circumstances:

- ~~.1 Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect shall determine for incomplete Work, retainage applicable to such work and unsettled claims; and  
(Section 9.8.5 of AIA Document A201–2007 requires release of applicable retainage upon Substantial Completion of Work with consent of surety, if any.)~~
- ~~.2 Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 9.10.3 of AIA Document A201–2007.~~

§ 5.1.8 Reduction or limitation of retainage, if any, shall be as follows:

(If it is intended, prior to Substantial Completion of the entire Work, to reduce or limit the retainage resulting from the percentages inserted in Sections 5.1.6.1 and 5.1.6.2 above, and this is not explained elsewhere in the Contract Documents, insert here provisions for such reduction or limitation.)



There shall be no reduction or limitation of retainage. Owner shall retain 10% on completed work through final completion.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

## § 5.2 FINAL PAYMENT

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Section 12.2.2 of AIA Document A201–2007, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

## ARTICLE 6 DISPUTE RESOLUTION

### § 6.1 INITIAL DECISION MAKER

The Architect will serve as Initial Decision Maker pursuant to Section 15.2 of AIA Document A201–2007, unless the parties appoint below another individual, not a party to this Agreement, to serve as Initial Decision Maker.

*(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

### § 6.2 BINDING DISPUTE RESOLUTION

For any Claim subject to, but not resolved by, mediation pursuant to Section 15.3 of AIA Document A201–2007, the method of binding dispute resolution shall be as follows:

*(Check the appropriate box. If the Owner and Contractor do not select a method of binding dispute resolution below, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.)*

☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2007

☒ Litigation in a court of competent jurisdiction

☐ Other (Specify)

## ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201–2007.

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201–2007.

## ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201–2007 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.



§ 8.2 Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

*(Insert rate of interest agreed upon, if any.)*

Zero % 0%

§ 8.3 The Owner's representative:  
*(Name, address and other information)*

Bryan Gillett, Planning Director  
7500 Odawa Circle  
Harbor Springs, MI 49740

§ 8.4 The Contractor's representative:  
*(Name, address and other information)*

§ 8.5 Neither the Owner's nor the Contractor's representative shall be changed without ten days written notice to the other party.

§ 8.6 Other provisions:

§ 8.6.1 Final Completion: Contractor shall achieve Final Completion not later November 30, 2016. Liquidated damages as identified in the agreement apply.

Liquidated Damages: Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is Complete within the time agreed upon, plus any extensions of time as allowed by the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal proceeding the actual loss suffered by the Owner if the Work is not Substantially Complete on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as penalty) Contractor shall pay the Owner Two Hundred Fifty Dollars (\$250) for each day that expires after the date of Final Completion until the Work is Complete. Liquidated Damages charges shall be deducted from the Contractor's final payment. The Owner reserves the right to demand legal proceedings should the actual loss exceed the damages provided herein.

§ 8.6.2 Davis Bacon and Related Acts (DBRA). DBRA are administered by the Wage and Hour Division. Contractors and subcontractors performing on federally funded or assisted contracts in, in excess of \$2,000.00 for the construction, alteration or repairs are required to pay their laborers not less than the prevailing wage rates and fringe benefits as determined by Department of Labor (DOL) and listed on the web site (www.dol.gov) under the Wage and Hour Division (WHD) for corresponding classes of laborers employed on similar project in the area and are listed in this contract (Addendum A i.e. MI130009 08/30/2013 MI9 "Davis-Bacon Wage Determination"). Apprentices may be employed at less than predetermined rates if they are in an apprenticeship program registered with the DOL or with a state apprenticeship agency recognized by the DOL. Trainees may be employed at less than predetermined rates if they are in a training program certified by the DOL. Contractors and subcontractors on prime contracts in excess \$100,000.00 are required, pursuant to the Contract Work Hours and Safety Standards Act, to pay employees one and one-half times their basic rates of pay for all hours over 40 worked on covered contract work in a

Init.



workweek. Covered Contractors and subcontractors are also required to pay employees weekly and to submit weekly certified payroll records to LTBB, the contracting agency, to the LTBB Accounting Office or designee (form wh347). (40 USC §276a; 29 CFR Parts 1, 3, 5, 6 and 7).

§ 8.6.3 The Parties understand that LTBB has enacted a statute, WOS 2012-008, the Sex Offender Registration and Notification Statute, to fulfill the obligations of sex offender registration and notification. All contractors, including their employees including all subcontractors and their employees that are sex offenders that are mandated to register are required to update their registry with the LTBB Law Enforcement when working on sites under the jurisdiction of LTBB.

## ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 The Contract Documents, except for Modifications issued after execution of this Agreement, are enumerated in the sections below.

§ 9.1.1 The Agreement is this executed AIA Document A101–2007, Standard Form of Agreement Between Owner and Contractor.

§ 9.1.2 The General Conditions are AIA Document A201–2007, General Conditions of the Contract for Construction, as modified (Refer to Document 007214.

§ 9.1.3 The Supplementary and other Conditions of the Contract:

Document	Title	Date	Pages
<u>None</u>			

§ 9.1.4 The Specifications:  
(Either list the Specifications here or refer to an exhibit attached to this Agreement.)

Section	Title	Date	Pages
<u>01 10 00</u>	<u>Summary</u>	<u>February 29, 2016</u>	<u>2</u>
<u>01 20 00</u>	<u>Price and Payment</u>	<u>February 29, 2016</u>	<u>4</u>
	<u>Procedures</u>		
<u>01 30 00</u>	<u>Administrative</u>	<u>February 29, 2016</u>	<u>6</u>
	<u>Requirements</u>		
<u>01 33 00</u>	<u>Submittal Procedures</u>	<u>February 29, 2016</u>	<u>5</u>
<u>01 40 00</u>	<u>Quality Requirements</u>	<u>February 29, 2016</u>	<u>4</u>
<u>01 50 00</u>	<u>Temporary Facilities</u>	<u>February 29, 2016</u>	<u>7</u>
	<u>and Controls</u>		
<u>01 57 13</u>	<u>Temporary Erosion and</u>	<u>February 29, 2016</u>	<u>2</u>
	<u>Sedimentation Control</u>		
<u>01 60 00</u>	<u>Product Requirements</u>	<u>February 29, 2016</u>	<u>3</u>
<u>01 70 00</u>	<u>Execution and Closeout</u>	<u>February 29, 2016</u>	<u>7</u>
	<u>Requirements</u>		

§ 9.1.5 The Drawings:  
(Either list the Drawings here or refer to an exhibit attached to this Agreement.)

Number	Title	Date
<u>T</u>	<u>Title Sheet / Project</u>	<u>February 29, 2016</u>
	<u>Information and Notes</u>	
<u>C1.1</u>	<u>Site Demolition Plan</u>	<u>February 29, 2016</u>
<u>C2.1</u>	<u>Site Layout Plan</u>	<u>February 29, 2016</u>
<u>C3.1</u>	<u>Site Grading Plan</u>	<u>February 29, 2016</u>
<u>D0.1</u>	<u>Composite Demolition</u>	<u>February 29, 2016</u>
	<u>Plan</u>	
<u>D1.1</u>	<u>Work Area Demolition</u>	<u>February 29, 2016</u>



<u>D1.2</u>	<u>Plan / Grade Level</u> <u>Work Area Demolition</u>	<u>February 29, 2016</u>
<u>A0.1</u>	<u>Plan / Basement and</u> <u>Upper Levels</u>	<u>February 29, 2016</u>
<u>A1.1</u>	<u>Composite Floor Plan</u> <u>Work Area Floor Plan /</u>	<u>February 29, 2016</u>
<u>A1.2</u>	<u>Grade Level</u> <u>Work Area Floor Plan /</u>	<u>February 29, 2016</u>
<u>A2.1</u>	<u>Basement and Upper</u> <u>Level</u>	<u>February 29, 2016</u>
<u>A3.1</u>	<u>Reception Counter Plan /</u> <u>Millwork Details</u>	<u>February 29, 2016</u>
<u>A4.1</u>	<u>Work Area Reflected</u> <u>Ceiling Plan / Grade</u>	<u>February 29, 2016</u>
<u>A5.1</u>	<u>Level</u> <u>Exterior Elevations /</u>	<u>February 29, 2016</u>
<u>A5.2</u>	<u>Building Details</u> <u>Door Schedule and</u>	<u>February 29, 2016</u>
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§ 9.1.6 The Addenda, if any:

Init.



Portions of Addenda relating to bidding requirements are not part of the Contract Documents unless the bidding requirements are also enumerated in this Article 9.

**§ 9.1.7** Additional documents, if any, forming part of the Contract Documents:

- .1 ~~AIA Document E201™ – 2007, Digital Data Protocol Exhibit, if completed by the parties, or the following:~~
- .2 Other documents, if any, listed below:  
(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201–2007 provides that bidding requirements such as advertisement or invitation to bid, Instructions to Bidders, sample forms and the Contractor's bid are not part of the Contract Documents unless enumerated in this Agreement. They should be listed here only if intended to be part of the Contract Documents.)

00 41 13 Bid Form – Stipulated Price as submitted by Bidder.

**ARTICLE 10 INSURANCE AND BONDS**

The Contractor shall purchase and maintain insurance and provide bonds as set forth in Article 11 of AIA Document A201–2007.

(State bonding requirements, if any, and limits of liability for insurance required in Article 11 of AIA Document A201–2007.)

<b>Type of insurance or bond</b>	<b>Limit of liability or bond amount (\$0.00)</b>
<u>Worker's Compensation</u>	<u>Statutory.</u>
<u>Comprehensive General Liability</u>	<u>Bodily Injury: \$1,000,000 Each Person / \$1,000,000 Each Occurrence.</u>
	<u>Personal Injury: \$1,000,000 Aggregate / \$1,000,000 General Aggregate.</u>
<u>Automobile Liability</u>	<u>Bodily Injury: \$1,000,000 Each Person / \$1,000,000 Each Occurrence.</u>
	<u>Property Damage: \$1,000,000 Each Occurrence.</u>
<u>Independent Contractors</u>	<u>Same limits as preceding.</u>
<u>Products and Complete Operations</u>	<u>Same limits as preceding for One (1) Year, commencing with issuance of final Certificate for Payment.</u>
<u>Contractual Liability</u>	<u>Same limits as preceding.</u>
<u>Performance Bond</u>	<u>100% of Contract Amount</u>
<u>Labor and Material Payment Bond</u>	<u>100% of Contract Amount</u>

This Agreement entered into as of the day and year first written above.

\_\_\_\_\_  
**OWNER** (Signature)

\_\_\_\_\_  
(Printed name and title)

\_\_\_\_\_  
**CONTRACTOR** (Signature)

\_\_\_\_\_  
(Printed name and title)



## 2016 Tribal Certificate of Exemption for Sales and Use Tax

Issued under authority of Public Act 616 of 2002. Filing is voluntary.

TO BE RETAINED IN THE SELLER'S RECORDS - DO NOT SEND TO TREASURY  
READ INSTRUCTIONS BEFORE COMPLETING THIS FORM.

**NOTICE TO SELLER:** Part 2 of this form lists the tribes that are authorized to use this certificate and indicates which tribes have authorized its Resident Tribal Members/Tribal Entities to use this form. This certificate is not valid unless it has a *Letter of Authorization* issued by the State of Michigan attached and is signed by an authorized tribal representative. This certificate is updated annually and may only be used for purchases made in the 2016 calendar year. Outdated certificates are not valid.

☐ Where this box is checked the Resident Tribal Member may only receive a 50% exemption on their purchase.

PART 1: PURCHASER				
Check the purchaser status: <input checked="" type="checkbox"/> Tribe <input type="checkbox"/> Resident Tribal Member/Tribal Entity (RTM/TE)				
Purchaser Name* Little Traverse Bay Bands of Odawa Indians			Federal Employer Identification No. (FEIN) or TR No. or ME No. 38-3236295	
Purchaser's Street Address (Number, Street) 7500 Odawa Circle			Social Security Number (Last 4 digits only)	
City or Town Harbor Springs	State MI	ZIP Code 49740	Tribal Member Number 9999	
* (1) TRIBAL PURCHASER: Enter Tribe, Tribal Business, Police Dept., School, etc.; (2) RTM/TE PURCHASER: Enter First Name, MI and Last Name, or Tribal Business				
PART 2: TRIBAL AFFILIATION				
Check the tribal affiliation of the purchaser:			Are RTM/TE authorized to use this Certificate of Exemption?	
<input type="checkbox"/>	01 Bay Mills Indian Community.....	YES		
<input type="checkbox"/>	02 Grand Traverse Band of Ottawa and Chippewa Indians.....	YES		
<input type="checkbox"/>	03 Match-E-Be-Nash-She-Wish Band of Pottawatomi Indians (Gun Lake Tribe).....	YES		
<input type="checkbox"/>	04 Hannahville Indian Community.....	YES		
<input type="checkbox"/>	07 Little River Band of Ottawa Indians.....	YES		
<input checked="" type="checkbox"/>	08 Little Traverse Bay Bands of Odawa.....	YES		
<input type="checkbox"/>	09 Nottawaseppi Huron Band of Potawatomi Indians.....	NO		
<input type="checkbox"/>	10 Pokagon Band of Potawatomi Indians.....	YES		
<input type="checkbox"/>	11 Saginaw Chippewa Indian Tribe of Michigan.....	YES		
<input type="checkbox"/>	12 Sault Ste. Marie Tribe of Chippewa Indians.....	YES		
PART 3: SELLER				
Enter name and address of the seller:				
PART 4: PURCHASES				
Check items covered by this <i>Tribal Certificate of Exemption</i> and provide the following information for each:				
<b>A: Tribal Purchases</b>				
<input checked="" type="checkbox"/>	Tangible personal property acquired within the Tribe's Tribal and Trust Lands for use exclusively within the Tribe's Tribal and Trust Lands.			
	<u>Item(s) To Be Acquired</u>	<u>Location Where Item(s) Will Be Used</u>		
	SUPPLIES, EQUIPMENT, SERVICES AND	ALL TRIBAL LOCATIONS, PROGRAMS,		
	LODGING	DEPARTMENTS, PROJECTS AND ENTITIES		
<input checked="" type="checkbox"/>	Tangible personal property acquired for Tribal Governmental Function (see instructions).			
	<u>Item(s) To Be Acquired</u>	<u>Governmental Function for the Item(s)</u>		
	SUPPLIES, EQUIPMENT, SERVICES AND	ALL TRIBAL PROGRAMS, FUNCTIONS, TRUST		
	LODGING	LANDS AND PROJECTS		

**PART 4: TRIBAL AND RTM/TE PURCHASES (Cont.)**

Check items covered by this *Tribal Certificate of Exemption* and provide the following information for each:

**A: Tribal Purchases (Cont.)**

- ☐ Buses used for transporting passengers to and from a gaming facility.

Year, Make and Model of Vehicle(s)

Vehicle Identification Number

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- ☒ Treaty fishing. Enter a description of the item(s) to be acquired.

ALL SUPPLIES, EQUIPMENT, SERVICES AND LODGING

\_\_\_\_\_  
\_\_\_\_\_

- ☒ Affixation to real estate (see instructions).

Item(s) To Be Acquired

Physical Address of Real Estate

BUILDING MATERIALS, SUPPLIES AND  
EQUIPMENT

ALL TRIBAL GOV'T LOCATIONS, ENTITIES,  
TRUST LANDS, PROJECTS, PROGRAMS,  
FUNCTIONS AND DEPARTMENTS

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**B: Resident Tribal Member/Tribal Entity Purchases**

- ☐ Affixation to real estate (see instructions).

Item(s) To Be Acquired

Physical Address of Real Estate

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- ☐ Personal use vehicles, recreational watercraft, snowmobiles and off-road vehicles.

Year, Make and Model of Vehicle

Vehicle Identification Number

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- ☐ Modular or mobile home to be used as a principal residence of a Resident Tribal Member.

Year, Make, Model, Size

Serial Number

Physical Address At Which Home Will Be Placed

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

- ☐ Tangible personal property acquired for use in treaty fishing. Enter a description of the item(s) below.

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**PART 5: CERTIFICATION**

The undersigned represents that he or she is authorized by the Tribe to execute this *Tribal Certificate of Exemption* and represents that he or she has reviewed the tax agreement between the Tribe and the State of Michigan and determined the Tribe, Resident Tribal Member or Tribal Entity is entitled to the exemption(s) claimed.

Signature of Authorized Tribal Representative

*Theresa Keshick*

Telephone Number

(231) 242-1584

Name and Title (Printed or Typed)

Theresa Keshick, LTBB Department of Commerce

Date Signed

1/1/2016





RICK SNYDER  
GOVERNOR

STATE OF MICHIGAN  
DEPARTMENT OF TREASURY  
LANSING

NICK A. KHOURI  
STATE TREASURER

December 8, 2015

RECEIVED

DEC 15 2015

Office of the Chairperson  
Little Traverse Bay Bands of Odawa Indians  
7500 Odawa Circle  
Harbor Springs, MI 49740

BY: LTBB-D.O.C.

To whom it may concern:

Letter of Authorization to Use Tribal Certificate of Exemption

The Michigan Department of Treasury acknowledges receipt of the Little Traverse Bay Bands of Odawa Indians' election to use *Tribal Certificates of Exemption* for **Tribal, Resident Tribal Member, and Tribal Entity** purchases as provided in the Tax Agreement between the State and the Tribe dated December 20, 2002.

The Michigan Department of Treasury issues this *Letter of Authorization* indicating that as of January 1, 2008, the **Tribe, its Resident Tribal Members, and Tribal Entities** are hereby authorized to use the *Tribal Certificate of Exemption* in accordance with the terms and conditions set forth in the Tax Agreement. This letter has been updated to reflect its continued use through the **calendar year 2016**.

A copy of this *Letter of Authorization* should be attached to all *Tribal Certificates of Exemption* that are authorized by the Tribe.

Very truly yours,

A handwritten signature in black ink, appearing to read "Walter A. Fratzke", with a long horizontal line extending to the right.

Walter A. Fratzke  
Tribal Affairs

c: James Bransky, General Counsel

**DOCUMENT 00 72 14**

**GENERAL CONDITIONS**

1.1 SUMMARY

- A. Document Includes:
  - 1. General Conditions.
- B. Related Documents:
  - 1. Document 00 52 14 - Agreement Form.

1.2 GENERAL CONDITIONS

- A. AIA Document A201-2007 General Conditions of the Contract for Construction, as modified and included herein, form the General Conditions of the Contract.

**END OF DOCUMENT**





# AIA®

# Document A201™ – 2007

## General Conditions of the Contract for Construction

for the following PROJECT:

*(Name and location or address)*

LTBB Odawa Indians; Governmental Center Archives Expansion  
7500 Odawa Circle, Harbor Springs, MI 49740

THE OWNER:

*(Name, legal status and address)*

LTBB Odawa Indians  
7500 Odawa Circle, Harbor Springs, MI 49740

THE ARCHITECT:

*(Name, legal status and address)*

Anthony Esson, Architect  
PO Box 479  
Gaylord, MI 49734

This document has important legal consequences.

Consultation with an attorney is encouraged with respect to its completion or modification.

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User Notes:

(1651780460)

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## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 BASIC DEFINITIONS**

#### **§ 1.1.1 THE CONTRACT DOCUMENTS**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

#### **§ 1.1.2 THE CONTRACT**

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### **§ 1.1.3 THE WORK**

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

#### **§ 1.1.4 THE PROJECT**

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

#### **§ 1.1.5 THE DRAWINGS**

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

#### **§ 1.1.6 THE SPECIFICATIONS**

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

#### **§ 1.1.7 INSTRUMENTS OF SERVICE**

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

#### **§ 1.1.8 INITIAL DECISION MAKER**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

### **§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS**

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.



§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

### § 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

### § 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

### § 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect and the Architect's consultants.

### § 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

If the parties intend to transmit Instruments of Service or any other information or documentation in digital form, they shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents.

## ARTICLE 2 OWNER

### § 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

### § 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. Thereafter, the Contractor may only request such evidence if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) a change in the Work materially changes the Contract Sum; or (3) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due. The Owner shall furnish such evidence as a condition precedent to commencement or continuation of the Work or

the portion of the Work affected by a material change. After the Owner furnishes the evidence, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

**§ 2.2.2** Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

**§ 2.2.3** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

**§ 2.2.4** The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

**§ 2.2.5** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

### **§ 2.3 OWNER'S RIGHT TO STOP THE WORK**

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

### **§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK**

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

## **ARTICLE 3 CONTRACTOR**

### **§ 3.1 GENERAL**

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**§ 3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents.

**§ 3.1.3** The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.



## **§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR**

**§ 3.2.1** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed and correlated personal observations with requirements of the Contract Documents.

**§ 3.2.2** Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

**§ 3.2.3** The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

**§ 3.2.4** If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

## **§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES**

**§ 3.3.1** The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be solely responsible for any loss or damage arising solely from those Owner-required means, methods, techniques, sequences or procedures.

**§ 3.3.2** The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

**§ 3.3.3** The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

## **§ 3.4 LABOR AND MATERIALS**

**§ 3.4.1** Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other

facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

### § 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

### § 3.6 TAXES

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect. Provided, The Owner represents that this project is exempt from Michigan sales and use taxes under the provisions of the Tax Agreement between the Little Traverse Bay Bands of Odawa Indians and the State of Michigan. The Contractor will not pay Michigan sales and use taxes on all materials that are purchased, used or acquired in the performance of this Contract that will not be removed from the site. Owner will provide the Contractor with exemption certificates and any other documents needed to make tax exempt purchases. Contractor shall execute certificates provided, and shall provide executed certificates to subcontractors and suppliers.

### § 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 ~~Unless otherwise provided in the Contract Documents, the Contractor~~ The Owner shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 **Concealed or Unknown Conditions.** If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.



§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

### § 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 Whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

### § 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

### § 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall prepare and submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

### § 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### § 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.



**§ 3.12.10** The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

### **§ 3.13 USE OF SITE**

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

### **§ 3.14 CUTTING AND PATCHING**

**§ 3.14.1** The Contractor shall be responsible for cutting, fitting or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

**§ 3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work.

### **§ 3.15 CLEANING UP**

**§ 3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project.

**§ 3.15.2** If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

### **§ 3.16 ACCESS TO WORK**

The Contractor shall provide the Owner and Architect access to the Work in preparation and progress wherever located.

### **§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS**

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a

patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

### **§ 3.18 INDEMNIFICATION**

**§ 3.18.1** To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

**§ 3.18.2** In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 GENERAL**

**§ 4.1.1** The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

**§ 4.1.2** Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

**§ 4.1.3** If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

### **§ 4.2 ADMINISTRATION OF THE CONTRACT**

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.



#### § 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Except as otherwise provided in the Contract Documents or when direct communications have been specially authorized, the Owner and Contractor shall endeavor to communicate with each other through the Architect about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

## ARTICLE 5 SUBCONTRACTORS

### § 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

### § 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

### § 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the



Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

#### **§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS**

**§ 5.4.1** Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

**§ 5.4.2** Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

**§ 5.4.3** Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

### **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

#### **§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS**

**§ 6.1.1** The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

**§ 6.1.2** When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

**§ 6.1.3** The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

**§ 6.1.4** Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

#### **§ 6.2 MUTUAL RESPONSIBILITY**

**§ 6.2.1** The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

**§ 6.2.2** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly report to the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that

the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work, except as to defects not then reasonably discoverable.

**§ 6.2.3** The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work or defective construction.

**§ 6.2.4** The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

**§ 6.2.5** The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

### **§ 6.3 OWNER'S RIGHT TO CLEAN UP**

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

## **ARTICLE 7 CHANGES IN THE WORK**

### **§ 7.1 GENERAL**

**§ 7.1.1** Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

**§ 7.1.2** A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

**§ 7.1.3** Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work.

### **§ 7.2 CHANGE ORDERS**

**§ 7.2.1** A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

### **§ 7.3 CONSTRUCTION CHANGE DIRECTIVES**

**§ 7.3.1** A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

**§ 7.3.2** A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

**§ 7.3.3** If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or



.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

- .1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;
- .2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and
- .5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

#### § 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

## ARTICLE 8 TIME

### § 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

### § 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

### § 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work; or by labor disputes, fire, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation and arbitration; or by other causes that the Architect determines may justify delay, then the Contract Time shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

## ARTICLE 9 PAYMENTS AND COMPLETION

### § 9.1 CONTRACT SUM

The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

### § 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the various portions of the Work and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

### § 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors and material suppliers, and shall reflect retainage if provided for in the Contract Documents.



§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

#### § 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either issue to the Owner a Certificate for Payment, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work has progressed to the point indicated and that the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment will further constitute a representation that the Contractor is entitled to payment in the amount certified. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

#### § 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

- .3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a separate contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

## § 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, shall create any fiduciary liability or tort liability on the part of the Contractor for breach of trust or shall entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

## § 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents the amount certified by the Architect or awarded by binding



dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

## **§ 9.8 SUBSTANTIAL COMPLETION**

**§ 9.8.1** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.

**§ 9.8.2** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**§ 9.8.3** Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

**§ 9.8.4** When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

**§ 9.8.5** The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

## **§ 9.9 PARTIAL OCCUPANCY OR USE**

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**§ 9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**§ 9.9.3** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

## **§ 9.10 FINAL COMPLETION AND FINAL PAYMENT**

**§ 9.10.1** Upon receipt of the Contractor's written notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

**§ 9.10.3** If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

**§ 9.10.4** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents; or
- .3 terms of special warranties required by the Contract Documents.

**§ 9.10.5** Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS**

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

### **§ 10.2 SAFETY OF PERSONS AND PROPERTY**

**§ 10.2.1** The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and



- 3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

#### § 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

#### § 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be

extended appropriately and the Contract Sum shall be increased in the amount of the Contractor's reasonable additional costs of shut-down, delay and start-up.

**§ 10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

**§ 10.3.4** The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

**§ 10.3.5** The Contractor shall indemnify the Owner for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

**§ 10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor for all cost and expense thereby incurred.

#### **§ 10.4 EMERGENCIES**

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

### **ARTICLE 11 INSURANCE AND BONDS**

#### **§ 11.1 CONTRACTOR'S LIABILITY INSURANCE**

**§ 11.1.1** The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

**§ 11.1.2** The insurance required by Section 11.1.1 shall be written for not less than limits of liability specified in the Contract Documents or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the



Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

**§ 11.1.3** Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2. Information concerning reduction of coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

**§ 11.1.4** The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

## **§ 11.2 OWNER'S LIABILITY INSURANCE**

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

## **§ 11.3 PROPERTY INSURANCE**

**§ 11.3.1** Unless otherwise provided, the Owner shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of the initial Contract Sum, plus value of subsequent Contract Modifications and cost of materials supplied or installed by others, comprising total value for the entire Project at the site on a replacement cost basis without optional deductibles. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by all persons and entities who are beneficiaries of such insurance, until final payment has been made as provided in Section 9.10 or until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered, whichever is later. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors in the Project.

**§ 11.3.1.1** Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake, flood, windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss.

**§ 11.3.1.2** If the Owner does not intend to purchase such property insurance required by the Contract and with all of the coverages in the amount described above, the Owner shall so inform the Contractor in writing prior to commencement of the Work. The Contractor may then effect insurance that will protect the interests of the Contractor, Subcontractors and Sub-subcontractors in the Work, and by appropriate Change Order the cost thereof shall be charged to the Owner. If the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain insurance as described above, without so notifying the Contractor in writing, then the Owner shall bear all reasonable costs properly attributable thereto.

**§ 11.3.1.3** If the property insurance requires deductibles, the Owner shall pay costs not covered because of such deductibles.

**§ 11.3.1.4** This property insurance shall cover portions of the Work stored off the site, and also portions of the Work in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

#### § 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance required by the Contract Documents or by law, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work, and the Owner and Contractor shall be named insureds.

#### § 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused.

§ 11.3.4 If the Contractor requests in writing that insurance for risks other than those described herein or other special causes of loss be included in the property insurance policy, the Owner shall, if possible, include such insurance, and the cost thereof shall be charged to the Contractor by appropriate Change Order.

§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Owner shall file with the Contractor a copy of each policy that includes insurance coverages required by this Section 11.3. Each policy shall contain all generally applicable conditions, definitions, exclusions and endorsements related to this Project. Each policy shall contain a provision that the policy will not be canceled or allowed to expire, and that its limits will not be reduced, until at least 30 days' prior written notice has been given to the Contractor.

#### § 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work, except such rights as they have to proceeds of such insurance held by the Owner as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the Owner's property insurance shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.3.10. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.



§ 11.3.9 If required in writing by a party in interest, the Owner as fiduciary shall, upon occurrence of an insured loss, give bond for proper performance of the Owner's duties. The cost of required bonds shall be charged against proceeds received as fiduciary. The Owner shall deposit in a separate account proceeds so received, which the Owner shall distribute in accordance with such agreement as the parties in interest may reach, or as determined in accordance with the method of binding dispute resolution selected in the Agreement between the Owner and Contractor. If after such loss no other special agreement is made and unless the Owner terminates the Contract for convenience, replacement of damaged property shall be performed by the Contractor after notification of a Change in the Work in accordance with Article 7.

§ 11.3.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers unless one of the parties in interest shall object in writing within five days after occurrence of loss to the Owner's exercise of this power; if such objection is made, the dispute shall be resolved in the manner selected by the Owner and Contractor as the method of binding dispute resolution in the Agreement. If the Owner and Contractor have selected arbitration as the method of binding dispute resolution, the Owner as fiduciary shall make settlement with insurers or, in the case of a dispute over distribution of insurance proceeds, in accordance with the directions of the arbitrators.

#### § 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner ~~shall have the right to require~~ requires the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.4.2 Performance and Payment Bonds shall be written on AIA Document A312 – 2010.

### ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

#### § 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

#### § 12.2 CORRECTION OF WORK

##### § 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

##### § 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require

correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

**§ 12.2.2.2** The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

**§ 12.2.2.3** The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

**§ 12.2.3** The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

**§ 12.2.4** The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

**§ 12.2.5** Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

#### **§ 12.3 ACCEPTANCE OF NONCONFORMING WORK**

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

### **ARTICLE 13 MISCELLANEOUS PROVISIONS**

#### **§ 13.1 GOVERNING LAW**

The Contract shall be governed by the law of the place where the Project is located except that, if the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

#### **§ 13.2 SUCCESSORS AND ASSIGNS**

**§ 13.2.1** The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

**§ 13.2.2** The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

#### **§ 13.3 WRITTEN NOTICE**

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

#### **§ 13.4 RIGHTS AND REMEDIES**

**§ 13.4.1** Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.



§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

## § 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

## § 13.6 INTEREST

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at such rate as the parties may agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

## § 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

- .2 An act of government, such as a declaration of national emergency that requires all Work to be stopped;
- .3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4 The Owner has failed to furnish to the Contractor promptly, upon the Contractor's request, reasonable evidence as required by Section 2.2.1.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

## § 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.



### **§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE**

**§ 14.3.1** The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work in whole or in part for such period of time as the Owner may determine.

**§ 14.3.2** The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

### **§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE**

**§ 14.4.1** The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

**§ 14.4.2** Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

**§ 14.4.3** In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work not executed.

## **ARTICLE 15 CLAIMS AND DISPUTES**

### **§ 15.1 CLAIMS**

#### **§ 15.1.1 DEFINITION**

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

#### **§ 15.1.2 NOTICE OF CLAIMS**

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

#### **§ 15.1.3 CONTINUING CONTRACT PERFORMANCE**

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

#### **§ 15.1.4 CLAIMS FOR ADDITIONAL COST**

If the Contractor wishes to make a Claim for an increase in the Contract Sum, written notice as provided herein shall be given before proceeding to execute the Work. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### **§ 15.1.5 CLAIMS FOR ADDITIONAL TIME**

**§ 15.1.5.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction.

#### § 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

#### § 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, 10.4, 11.3.9, and 11.3.10, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.



§ 15.2.6.1 Either party may, within 30 days from the date of an initial decision, demand in writing that the other party file for mediation within 60 days of the initial decision. If such a demand is made and the party receiving the demand fails to file for mediation within the time required, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### § 15.3 MEDIATION

~~§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.~~

~~§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.~~

~~§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.~~

### § 15.4 ARBITRATION

~~§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.~~

~~§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.~~

~~§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.~~

~~§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.~~

#### **~~§ 15.4.4 CONSOLIDATION OR JOINDER~~**

**~~§ 15.4.4.1~~** Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

**~~§ 15.4.4.2~~** Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

**~~§ 15.4.4.3~~** The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.



**SECTION 01 10 00**

**SUMMARY**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Contract description.
- B. Work by Owner.
- C. Owner supplied products.
- D. Contractor's use of site and premises.
- E. Future work.
- F. Work sequence.
- G. Owner occupancy.
- H. Specification Conventions.

**1.2 CONTRACT DESCRIPTION**

- A. Perform Work of Contract under stipulated sum contract with Owner in accordance with Conditions of Contract.

**1.3 WORK BY OWNER**

- A. Items noted NIC (Not in Contract) will be furnished and installed by Owner beginning after date of Substantial Completion.

**1.4 OWNER SUPPLIED PRODUCTS – Not Used**

**1.5 CONTRACTOR'S USE OF SITE AND PREMISES**

- A. Limit use of site and premises to allow:
  - 1. Owner occupancy.
  - 2. Work by Others and Work by Owner.
  - 3. Use of site and premises by the public.
- B. Maintain emergency building exits during construction.
- C. Time Restrictions for Performing Work Disruptive to Owner's Operations: Perform work disruptive of Owner's operations outside normal Owner's normal business hours. Coordinate requirements and scheduling of disruptive work with Owner.
- D. Utility Outages and Shutdown: Schedule required utility outages and shutdowns with the Owner to minimize impact on Owner's operations.

1.6 FUTURE WORK – Not Used

1.7 WORK SEQUENCE – Not Used

1.8 OWNER OCCUPANCY

- A. The Owner will occupy areas to be remodeled through April 15, 2016.
- B. The Owner will occupy the adjacent site and premises during the entire period of construction for the conduct of normal operations. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

1.9 SPECIFICATION CONVENTIONS

- A. These specifications are written in imperative mood and streamlined form. This imperative language is directed to the Contractor, unless specifically noted otherwise. The words "shall be" are included by inference where a colon (:) is used within sentences or phrases.
- B. The Architect has endeavored to prepare Contract Documents without conflicts or inconsistencies, however it shall be recognized by the Contractor that conflicts and inconsistencies in the Drawings and Specifications may occasionally occur. As such, in case of a conflict or inconsistency in the Drawings or Specifications not brought to the Architects attention prior to Bidding and/or clarified by Addendum, the Contractor shall have deemed to include the higher quantity or quality of material, or more labor intensive or costly installation in the Bid.
- C. The Architect has endeavored to coordinate various aspects of the project in the preparation of the Contract Documents, however it shall be recognized by the Contractor that components of the work of any one trade may be identified at various locations throughout the Contract Documents. As such, the Contractor is responsible for the Work identified in the Contract Documents as a whole, irrespective of the specific locations of the information provided.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

**END OF SECTION**



**SECTION 01 20 00**

**PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Cash allowances.
- B. Contingency allowances.
- C. Testing and inspection allowances.
- D. Schedule of values.
- E. Applications for payment.
- F. Change procedures.
- G. Defect assessment.
- H. Unit prices.
- I. Alternates.

**1.2 CASH ALLOWANCES**

- A. Costs Included in Cash Allowances: Cost of product to Contractor or Subcontractor, less applicable trade discounts.
- B. Costs Not Included in Cash Allowances But Included in Contract Sum/Price: Product delivery to site and handling at site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing.
- C. Architect/Engineer Responsibilities:
  - 1. Confirm quantities.
  - 2. Prepare Change Order.
- D. Contractor Responsibilities:
  - 1. Assist Owner in selection of products.
  - 2. On notification of selection by Owner, execute purchase agreement with designated supplier.
  - 3. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
  - 4. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.
- E. Differences in costs will be adjusted by Change Order.
- F. Allowances Schedule:

1. Section 09 68 16 – Sheet Carpeting: Include the total cost of material based on the unit price of \$18.00 per square yard for purchase of sheet carpeting. Cost of accessory materials required for installation is to be included in Contract Sum. Cash Allowance applies only to cost of sheet carpeting material.

### 1.3 CONTINGENCY ALLOWANCES

- A. A Contingency Allowance has been established by the Owner.

### 1.4 TESTING AND INSPECTION ALLOWANCES – Not Used

### 1.5 SCHEDULE OF VALUES

- A. Submit printed schedule on AIA Form G703 - Continuation Sheet for G702. Contractor's standard form or electronic media printout following format of specified AIA form will be considered.
- B. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.
- C. Format: Utilize Table of Contents of this Project Manual. Identify each line item with number and title of major specification Section. Identify site mobilization, bonds and insurance, and General Requirements as separate line items.
- D. Include in each line item, amount of Allowances specified in this section. For unit cost Allowances, identify quantities taken from Contract Documents multiplied by unit cost to achieve total for each item.
- E. Include in each line item, direct proportional amount of Contractor's overhead and profit.
- F. Revise schedule to list approved Change Orders, with each Application for Payment. List each cost change by item separately.

### 1.6 APPLICATIONS FOR PAYMENT

- A. Submit three copies of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or approved Contractor's electronic media driven form.
- B. Content and Format: Utilize Schedule of Values for listing items in Application for Payment.
- C. Submit updated construction schedule with each Application for Payment.
- D. Payment Period: Submit at intervals stipulated in the Agreement.
- E. Submit with transmittal letter as specified for Submittals in Section 01 33 00 - Submittal Procedures.
- F. Submit a fully executed Sworn Statement indicating all monies owed as of the date of application. Sworn statements shall reflect the amount invoiced to the Contractor less any retention being withheld.
- G. Submit unconditional waivers of lien for each subcontractor and supplier included on the sworn statement. Waivers shall reflect the payment amount released to the subcontractor / supplier.



Payment will not be released without verification of waivers for the full balance of the previous payment.

- H. Substantiating Data: When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Include the following with Application for Payment:
  - 1. Partial release of liens from major subcontractors and vendors.
  - 2. Affidavits attesting to off-site stored products.
  - 3. Construction progress schedules, revised and current.

## 1.7 CHANGE PROCEDURES

- A. The Architect/Engineer will advise of minor changes in the Work not involving adjustment to Contract Sum/Price or Contract Time by issuing supplemental instructions in writing to the Contractor.
- B. The Architect/Engineer may issue a Proposal Request or Bulletin including a detailed description of proposed change with supplementary or revised Drawings and specifications. Contractor will prepare and submit estimate of cost and any required change in Contract Time within 14 days.
- C. Contractor may, upon request of the Architect, propose changes by submitting a request for change to Architect/Engineer describing proposed change and its full effect on the Work. Include a statement describing reason for the change, and effect on Contract Sum/Price and Contract Time with full documentation and a statement describing effect on Work by separate or other Contractors.
- D. Stipulated Sum/Price Change Order: Based on Proposal Request (Bulletins) and Contractor's fixed price quotation or Contractor's request for Change Order as approved by Architect/Engineer.
- E. Unit Price Change Order: For contract unit prices and quantities, the Change Order will be executed on fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.
- F. Construction Change Directive: Architect/Engineer may issue directive, on AIA Form G713 Construction Change Directive signed by Owner, instructing Contractor to proceed with change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work, and designate method of determining any change in Contract Sum/Price or Contract Time. Promptly execute change.
- G. Time and Material Change Order: Submit itemized account and supporting data after completion of change, within time limits indicated in Conditions of the Contract. Architect/Engineer will determine change allowable in Contract Sum/Price and Contract Time as provided in Contract Documents.
- H. Maintain detailed records of work done on Time and Material basis. Provide full information required for evaluation of proposed changes, and to substantiate costs for changes in the Work.
- I. Document each quotation for change in cost or time with sufficient data to allow evaluation of quotation.
- J. Change Order Forms: AIA G701 Change Order.

- K. Execution of Change Orders: Architect/Engineer will issue Change Orders for signatures of parties as provided in Conditions of the Contract.
- L. Correlation Of Contractor Submittals:
  - 1. Promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as separate line item and adjust Contract Sum/Price.
  - 2. Promptly revise progress schedules to reflect change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
  - 3. Promptly enter changes in Project Record Documents.

#### 1.8 DEFECT ASSESSMENT

- A. Replace the Work, or portions of the Work, not conforming to specified requirements.
- B. If, in the opinion of the Architect/Engineer, it is not practical to remove and replace the Work, the Architect/Engineer will direct appropriate remedy or adjust payment.
- C. The defective Work may remain, but unit sum/price will be adjusted to new sum/price at discretion of Owner.
- D. Defective Work will be partially repaired to instructions of Architect/Engineer, and unit sum/price will be adjusted to new sum/price at discretion of Owner.
- E. Individual specification sections may modify these options or may identify specific formula or percentage sum/price reduction.
- F. Authority of Architect/Engineer to assess defects is final.
- G. Non-Payment For Rejected Products: Payment will not be made for rejected products for any of the following:
  - 1. Products wasted or disposed of in a manner that is not acceptable.
  - 2. Products determined as unacceptable before or after placement.
  - 3. Products not completely unloaded from transporting vehicle.
  - 4. Products placed beyond lines and levels of required Work.
  - 5. Products remaining on hand after completion of the Work.
  - 6. Loading, hauling, and disposing of rejected products.

#### 1.9 UNIT PRICES – Not Used

#### 1.10 ALTERNATES – Not Used

#### PART 2 PRODUCTS - Not Used

#### PART 3 EXECUTION - Not Used

### END OF SECTION



**SECTION 01 30 00**

**ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Coordination and project conditions.
- B. Field engineering.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Periodic construction visits.
- G. Pre-installation meetings.
- H. Project Record Documents.
- I. Acceptance of Preceding Work.
- J. Cutting and patching.
- K. Special procedures.

**1.2 COORDINATION AND PROJECT CONDITIONS**

- A. Coordinate scheduling, submittals, and Work of various sections of Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Verify utility requirements and characteristics of operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, operating equipment.
- C. Coordinate space requirements, supports, and installation of mechanical and electrical Work indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- D. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within construction. Coordinate locations of fixtures and outlets with finish elements.
- E. Coordinate completion and clean-up of Work of separate sections in preparation for Substantial Completion.

- F. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

### 1.3 FIELD ENGINEERING

- A. Employ Land Surveyor registered in State of Michigan and acceptable to Architect/Engineer.
- B. Locate and protect survey control and reference points. Promptly notify Architect/Engineer of discrepancies discovered.
- C. Control datum for survey is that shown on Drawings.
- D. Verify set-backs and easements; confirm drawing dimensions and elevations.
- E. Provide field engineering services. Establish elevations, lines, and levels, utilizing recognized engineering survey practices.
- F. Submit copy of site drawing and certificate signed by Land Surveyor certifying elevations and locations of the Work are in conformance with Contract Documents.
- G. Maintain complete and accurate log of control and survey work as Work progresses.
- H. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- I. Promptly report to Architect/Engineer loss or destruction of reference point or relocation required because of changes in grades or other reasons.
- J. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect/Engineer.

### 1.4 PRECONSTRUCTION MEETING

- A. Architect/Engineer will schedule meeting after Notice of Award.
- B. Attendance Required: Owner, Architect/Engineer, and Contractor.
- C. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.
  - 4. Submission of list of Subcontractors, list of products, schedule of values, and progress schedule.
  - 5. Designation of personnel representing parties in Contract, and Architect/Engineer.
  - 6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  - 7. Scheduling.
  - 8. Scheduling activities of Testing agency.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.



## 1.5 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required: Job superintendent, major subcontractors and suppliers, Owner, Architect/Engineer, as appropriate to agenda topics for each meeting.
- D. Agenda:
  - 1. Review minutes of previous meetings.
  - 2. Review of Work progress.
  - 3. Field observations, problems, and decisions.
  - 4. Identification of problems impeding planned progress.
  - 5. Review of submittals schedule and status of submittals.
  - 6. Review of off-site fabrication and delivery schedules.
  - 7. Maintenance of progress schedule.
  - 8. Corrective measures to regain projected schedules.
  - 9. Planned progress during succeeding work period.
  - 10. Coordination of projected progress.
  - 11. Maintenance of quality and work standards.
  - 12. Effect of proposed changes on progress schedule and coordination.
  - 13. Other business relating to Work.
  - 14. Coordination of work by Owner's Contractor with work of the General Contract.
  - 15. Project Record Documents.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

## 1.6 PERIODIC CONSTRUCTION VISITS

- A. The Architect and Owner will visit the project site at weekly intervals. The purpose of the visits will be to monitor the progress and quality of the work.
- B. The Contractor's Site Superintendent shall be available for meetings with the Architect and Owner.
- C. Agenda:
  - 1. Review of Work in progress.
  - 2. Field observations, problems, and decisions.
  - 3. Identification of problems which impede planned progress.
  - 4. Maintenance of progress schedule.
  - 5. Corrective measures to regain projected schedules.
  - 6. Planned progress during succeeding work period.
  - 7. Maintenance of quality and work standards.
  - 8. Other business relating to Work.

## 1.7 PRE-INSTALLATION MEETINGS

- A. When required in individual specification sections, convene pre-installation meetings at Project site prior to commencing work of specific section.

- B. Require attendance of parties directly affecting, or affected by, Work of specific section.
- C. Notify Architect/Engineer four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of installation, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect/Engineer, Owner, and those affected by decisions made.

#### 1.8 PROJECT RECORD DOCUMENTS

- A. Contractor shall maintain and update Project Record Drawings (As-Built Drawings) on site during construction. Contractor and each Subcontractor shall be responsible to update the as built drawings on a weekly basis.
- B. Project Record Documents shall be available for review by the Architect.

#### PART 2 PRODUCTS - Not Used

#### PART 3 EXECUTION

##### 3.1 ACCEPTANCE OF PRECEDING WORK

- A. Before starting any operation, each Contractor(s) shall examine work performed by others to which their work adjoins or is applied and shall report to the Architect any conditions that will prevent satisfactory accomplishment of their work.
- B. Failure to notify the Architect of deficiencies or faults in preceding work will constitute acceptance thereof and waive of any claims to its usability.

##### 3.2 CUTTING AND PATCHING

- A. Employ skilled and experienced installer to perform cutting and patching.
- B. Submit written request in advance of cutting or altering elements affecting:
  - 1. Structural integrity of element.
  - 2. Integrity of weather-exposed or moisture-resistant elements.
  - 3. Efficiency, maintenance, or safety of element.
  - 4. Visual qualities of sight exposed elements.
  - 5. Work of Owner or separate contractor.
- C. Execute cutting, fitting, and patching including excavation and fill, to complete Work, and to:
  - 1. Fit the several parts together, to integrate with other Work.
  - 2. Uncover Work to install or correct ill-timed Work.
  - 3. Remove and replace defective and non-conforming Work.
  - 4. Remove samples of installed Work for testing.
  - 5. Provide openings in elements of Work for penetrations of mechanical and electrical Work.



- D. Execute work by methods to avoid damage to other Work, and to provide proper surfaces to receive patching and finishing.
- E. Cut masonry and concrete materials using masonry saw or core drill.
- F. Restore Work with new products in accordance with requirements of Contract Documents.
- G. Fit Work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- H. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.
- I. Refinish surfaces to match adjacent finishes. For continuous surfaces, refinish to nearest intersection; for assembly, refinish entire unit.

### 3.3 SPECIAL PROCEDURES

- A. Materials: As specified in product sections; match existing with new products for patching and extending work. Use salvaged products only where indicated in Drawings.
- B. Employ skilled and experienced installer to perform alteration work.
- C. Cut, move, or remove items as necessary for access to alterations and renovation Work. Replace and restore at completion.
- D. Remove unsuitable material not marked for salvage, including rotted wood, corroded metals, and deteriorated masonry and concrete. Replace materials as specified for finished Work.
- E. Remove debris and abandoned items from area and from concealed spaces.
- F. Prepare surface and remove surface finishes to permit installation of new work and finishes.
- G. Close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity.
- H. Remove, cut, and patch Work in manner to minimize damage and to permit restoring products and finishes to original or specified condition.
- I. Refinish existing visible surfaces to remain in renovated rooms and spaces, to specified condition for each material, with neat transition to adjacent finishes.
- J. Where new Work abuts or aligns with existing, provide smooth and even transition. Patch Work to match existing adjacent Work in texture and appearance.
- K. When finished surfaces are cut so that smooth transition with new Work is not possible, terminate existing surface along straight line at natural line of division and submit recommendation to Architect/Engineer for review.
- L. Where change of plane of 1/4 inch or more occurs, request instructions from Architect/Engineer.
- M. Patch or replace portions of existing surfaces which are damaged, lifted, discolored, or showing other imperfections.

- N. Finish surfaces as specified in individual product sections.

**END OF SECTION**



**SECTION 01 33 00**  
**SUBMITTAL PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Proposed products list.
- D. Product data.
- E. Shop drawings.
- F. Samples.
- G. Design data.
- H. Test reports.
- I. Certificates.
- J. Manufacturer's instructions.
- K. Manufacturer's field reports.
- L. Erection drawings.

**1.2 SUBMITTAL PROCEDURES**

- A. Electronic Submittals: Prepare and transmit submittals of Product Data, Shop Drawings, Design Data, Test Reports, Certificates, Manufacturers Instructions, and Erection Drawings to Architect in electronic (.pdf) format.
- B. Samples: Where specifications require the submittal of samples for verification or selection, submit physical samples and/or physical color charts to the Architect. Electronic reproductions of color charts will not be accepted. Include Contractor's transmittal form identifying Project, Contractor, subcontractor and supplier; product designated by name indicated in specifications.
- C. Transmit electronic submittals with Contractor's transmittal form:
  - 1. Sequentially number submittals. Include the specification section in the submittal numbering system. Mark revised submittals with original number and sequential alphabetic suffix.
  - 2. Identify Project, Contractor, subcontractor and supplier; product designated by name indicated in specifications.

- D. Include Contractor's certification (stamp), signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with requirements of the Work and Contract Documents.
- E. Schedule submittals to expedite Project. Coordinate submission of related items.
- F. For each submittal for review, allow 15 days excluding delivery time to and from Contractor. Submittals for long lead time items shall be expedited by the Contractor in order to allow for the Owner's completion schedule. Notify Architect/Engineer of long lead time items requiring expedited review.
- G. Identify variations from Contract Documents and product or system limitations which may be detrimental to successful performance of completed Work.
- H. Architect will return files electronically following review. Contractor shall distribute copies of reviewed submittals to appropriate parties.
- I. Contractor shall produce and provide a paper copy of approved submittals to the Architect, and to governing authorities upon request.
- J. Where specified in specific Submittals Articles, Contractor shall provide a paper copy of approved submittals to the Owner at closeout.
- K. When revised for resubmission, identify changes made since previous submission.
- L. Submittals not requested will not be recognized or processed.

### 1.3 CONSTRUCTION PROGRESS SCHEDULES

- A. Submit initial schedules within 7 days after Notice to Proceed. After review, resubmit required revised data within ten days.
- B. Submit revised Progress Schedules with each Application for Payment.
- C. Distribute copies of reviewed schedules to Project site file, subcontractors, suppliers, and other concerned parties.
- D. Instruct recipients to promptly report, in writing, problems anticipated by projections indicated in schedules.
- E. Utilize Contractor's standard computer generated schedule format.
- F. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate early and late start, early and late finish, float dates, and duration.
- G. Indicate estimated percentage of completion for each item of Work at each submission.
- H. Revisions To Schedules:
  - 1. Indicate progress of each activity to date of submittal, and projected completion date of each activity.
  - 2. Identify activities modified since previous submittal, major changes in scope, and other identifiable changes.



3. Prepare narrative report to define problem areas, anticipated delays, and impact on Schedule. Report corrective action taken, or proposed, and its effect [including effect of changes on schedules of separate contractors].

#### 1.4 PROPOSED PRODUCTS LIST

- A. Within 7 days after Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
- B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

#### 1.5 PRODUCT DATA

- A. Product Data: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Mark submittal to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- C. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

#### 1.6 SHOP DRAWINGS

- A. Shop Drawings: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Indicate special utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. When required by individual specification sections, provide shop drawings signed and sealed by professional engineer responsible for designing components shown on shop drawings.
  1. Include signed and sealed calculations to support design.
  2. Submit drawings and calculations in form suitable for submission to and approval by authorities having jurisdiction.
  3. Make revisions and provide additional information when required by authorities having jurisdiction.
- D. After review, produce copies and distribute in accordance with SUBMITTAL PROCEDURES article and for record documents described in Section 01 70 00 - Execution and Closeout Requirements.

#### 1.7 SAMPLES

- A. Samples: Submit to Architect/Engineer for review for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.
- B. Samples For Selection as Specified in Product Sections:

1. Submit to Architect/Engineer for aesthetic, color, or finish selection.
  2. Submit samples of finishes from full range of manufacturers' standard colors, including premium and/or custom colors where specified, textures, and patterns for Architect/Engineer selection.
- C. Submit samples to illustrate functional and aesthetic characteristics of Products, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- D. Include identification on each sample, with full Project information.
- E. Submit number of samples specified in individual specification sections; Architect/Engineer will retain samples.
- F. Samples will not be used for testing purposes unless specifically stated in specification section.
- G. Architect will issue a schedule indicating colors selected.

#### 1.8 DESIGN DATA

- A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

#### 1.9 TEST REPORTS

- A. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.
- B. Submit test reports for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

#### 1.10 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or Contractor to Architect/Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect/Engineer.

#### 1.11 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, [start-up,] adjusting, and finishing, to Architect/Engineer for delivery to Owner in quantities specified for Product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.



1.12 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for Architect/Engineer's benefit as contract administrator or for Owner.
- B. Submit report [in duplicate] within 5 days of observation to Architect/Engineer for information.
- C. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.

1.13 ERECTION DRAWINGS

- A. Submit drawings for Architect/Engineer's benefit as contract administrator or for Owner.
- B. Submit for information for limited purpose of assessing conformance with information given and design concept expressed in Contract Documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by Architect/Engineer or Owner.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

**END OF SECTION**

**SECTION 01 40 00**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Quality control and control of installation.
- B. Tolerances.
- C. References.
- D. Labeling.
- E. Mock-up requirements.
- F. Testing and inspection services.
- G. Manufacturers' field services.
- H. Examination.
- I. Preparation.

**1.2 QUALITY CONTROL AND CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. When manufacturers' instructions conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on Shop Drawings or as instructed by manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

**1.3 TOLERANCES**

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.



- B. Comply with manufacturers' tolerances. When manufacturers' tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

#### 1.4 REFERENCES

- A. For products or workmanship specified by association, trade, or other consensus standards, comply with requirements of standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current on date of Contract Documents, except where specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. When specified reference standards conflict with Contract Documents, request clarification from Architect/Engineer before proceeding.
- E. Neither contractual relationships, duties, nor responsibilities of parties in Contract nor those of Architect/Engineer shall be altered from Contract Documents by mention or inference otherwise in reference documents.

#### 1.5 LABELING

- A. Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code.
- B. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.
  - 1. Model number.
  - 2. Serial number.
  - 3. Performance characteristics.

#### 1.6 MOCK-UP REQUIREMENTS

- A. Tests will be performed under provisions identified in this section and identified in respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be comparison standard for remaining Work.
- D. Where mock-up has been accepted by Architect/Engineer and is specified in product specification sections to be removed; remove mock-up and clear area when directed to do so by Architect/Engineer.

#### 1.7 TESTING AND INSPECTION SERVICES

- A. Owner will employ and pay for specified services of an independent firm to perform testing and inspection.

- B. The independent firm will perform tests, inspections and other services specified in individual specification sections and as required by Authority having jurisdiction.
  - 1. Laboratory: Authorized to operate in State of Michigan.
  - 2. Laboratory Staff: Maintain full time registered Engineer on staff to review services.
  - 3. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to National Bureau of Standards or accepted values of natural physical constants.
- C. Testing, inspections and source quality control may occur on or off project site. Perform off-site testing as required by Architect/Engineer or Owner.
- D. Reports will be submitted by independent firm to Architect/Engineer, Contractor, and authority having jurisdiction, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
  - 1. Submit final report indicating correction of Work previously reported as non-compliant.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
  - 1. Notify independent firm 24 hours prior to expected time for operations requiring services.
  - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing and/or employment of testing agency or laboratory shall not relieve Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- G. Re-testing or re-inspection required because of non-conformance to specified requirements shall be performed by same independent firm on instructions by Architect/Engineer. Payment for re-testing or re-inspection will be charged to Contractor by deducting testing charges from Contract Sum/Price.
- H. Agency Responsibilities:
  - 1. Test samples of mixes submitted by Contractor.
  - 2. Provide qualified personnel at site. Cooperate with Architect/Engineer and Contractor in performance of services.
  - 3. Perform specified sampling and testing of products in accordance with specified standards.
  - 4. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 5. Promptly notify Architect/Engineer and Contractor of observed irregularities or non-conformance of Work or products.
  - 6. Perform additional tests required by Architect/Engineer.
  - 7. Attend preconstruction meetings and progress meetings.
- I. Agency Reports: After each test, promptly submit two copies of report to Architect/Engineer, Contractor, and authority having jurisdiction. When requested by Architect/Engineer, provide interpretation of test results. Include the following:
  - 1. Date issued.
  - 2. Project title and number.
  - 3. Name of inspector.
  - 4. Date and time of sampling or inspection.
  - 5. Identification of product and specifications section.
  - 6. Location in Project.
  - 7. Type of inspection or test.
  - 8. Date of test.
  - 9. Results of tests.
  - 10. Conformance with Contract Documents.



- J. Limits On Testing Authority:
  - 1. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency or laboratory may not approve or accept any portion of the Work.
  - 3. Agency or laboratory may not assume duties of Contractor.
  - 4. Agency or laboratory has no authority to stop the Work.

#### 1.8 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 30 days in advance of required observations.
- C. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.
- D. Refer to Section 01 33 00 - Submittal Procedures, MANUFACTURERS' FIELD REPORTS article.

#### PART 2 PRODUCTS - Not Used

#### PART 3 EXECUTION

##### 3.1 EXAMINATION

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of correct characteristics, and in correct locations.

##### 3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying new material or substance in contact or bond.

**END OF SECTION**

**SECTION 01 50 00**

**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Temporary Utilities:
  - 1. Temporary electricity.
  - 2. Temporary lighting for construction purposes.
  - 3. Temporary heating.
  - 4. Temporary cooling.
  - 5. Temporary ventilation.
  - 6. Telephone service.
  - 7. Facsimile service.
  - 8. Email service.
  - 9. Temporary water service.
  - 10. Temporary sanitary facilities.
- B. Construction Facilities:
  - 1. Field offices and sheds.
  - 2. Vehicular access.
  - 3. Parking.
  - 4. Progress cleaning and waste removal.
  - 5. Project identification.
  - 6. Traffic regulation.
  - 7. Fire prevention facilities.
- C. Temporary Controls:
  - 1. Barriers.
  - 2. Enclosures and fencing.
  - 3. Security.
  - 4. Water control.
  - 5. Dust control.
  - 6. Erosion and sediment control.
  - 7. Noise control.
  - 8. Pest control.
  - 9. Pollution control.
  - 10. Rodent control.
- D. Removal of utilities, facilities, and controls.

**1.2 TEMPORARY ELECTRICITY**

- A. Owner will pay cost of energy used. Exercise measures to conserve energy. Utilize Owner's existing power service.
- B. Provide temporary electric feeder from existing electrical service. Do not disrupt Owner's use of service.



- C. Provide power outlets, with branch wiring and distribution boxes located as required for construction operations. Provide flexible power cords as required for portable construction tools and equipment.
- D. Provide distribution equipment, wiring, and outlets to provide single phase branch circuits for power and lighting.
  - 1. Provide 20 ampere duplex outlets, single phase circuits for power tools as required.
  - 2. Provide 20 ampere, single phase branch circuits for lighting.

### 1.3 TEMPORARY LIGHTING FOR CONSTRUCTION PURPOSES

- A. Provide and maintain lighting for construction operations to achieve minimum lighting level of 2 watt/sq ft.
- B. Provide and maintain 1 watt/sq ft lighting to exterior staging and storage areas after dark for security purposes.
- C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.
- D. Maintain lighting and provide routine repairs.
- E. Permanent building lighting may be utilized during construction.

### 1.4 TEMPORARY HEATING

- A. Provide and pay for heating devices as needed to maintain specified conditions for construction operations.
- B. Owner will pay cost of temporary heat. Exercise measures to conserve energy.
- C. Enclose building prior to activating temporary heat in accordance with Enclosures article in this section.
- D. Prior to operation of permanent equipment for temporary heating purposes, verify installation is approved for operation, equipment is lubricated and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- E. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in product sections.

### 1.5 TEMPORARY COOLING – Not Used

### 1.6 TEMPORARY VENTILATION

- A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

### 1.7 TELEPHONE SERVICE

- A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

1.8 FACSIMILE SERVICE – Not Used

1.9 EMAIL SERVICE

- A. Provide, maintain and pay for email service to site Superintendent and Project Manager at time of project mobilization

1.10 TEMPORARY WATER SERVICE

- A. Provide for suitable quality water service as needed to maintain specified conditions for construction operations.
- B. Owner will pay cost of temporary water. Exercise measures to conserve energy. Utilize Owner's existing water system, extend and supplement with temporary devices as needed to maintain specified conditions for construction operations.
- C. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.11 TEMPORARY SANITARY FACILITIES

- A. Provide and maintain required facilities and enclosures. Provide facilities at time of project mobilization.

1.12 FIELD OFFICES AND SHEDS

- A. Office: Weather tight, with lighting, electrical outlets, heating, ventilating, and equipped with sturdy furniture, drawing rack, and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate all attendees.
- C. Locate offices and sheds minimum distance of 30 feet from existing and new structures.
- D. When permanent facilities are enclosed with operable utilities, relocate offices and storage into building, with written agreement of Owner, and remove temporary buildings.
- E. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.
  - 1. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove when no longer needed.
  - 2. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.
  - 3. Exterior Materials: Weather resistant, finished in color acceptable to Owner.
  - 4. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.
  - 5. Lighting for Offices: 50 ft C at desk top height, exterior lighting at entrance doors.
  - 6. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.
- F. Environmental Control:
  - 1. Heating, and Ventilating for Offices: Automatic equipment to maintain comfort conditions 68 degrees F heating.

- 2. Storage Spaces: Heating and ventilation as needed to maintain products in accordance with Contract Documents; lighting for maintenance and inspection of products.
- G. Storage Areas And Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 60 00 - Product Requirements.
- H. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.
- I. Installation:
  - 1. Install office spaces ready for occupancy 15 days after Notice to Proceed.
  - 2. Employee Residential Occupancy: Not allowed on Owner's property.
- J. Maintenance And Cleaning:
  - 1. Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas.
  - 2. Maintain approach walks free of mud, water, and snow.
- K. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

#### 1.13 VEHICULAR ACCESS

- A. Use existing on-site roads for construction traffic.
- B. Mud From Site Vehicles: Provide means of removing mud from vehicle wheels before entering streets.

#### 1.14 PARKING

- A. Use of existing on-site streets and driveways used for construction traffic is permitted. Tracked vehicles not allowed on paved areas.
- B. Do not allow heavy vehicles or construction equipment in parking areas without measures to prevent damage to pavement.
- C. Maintenance:
  - 1. Maintain traffic and parking areas in sound condition free of excavated material, construction equipment, products, mud, snow, and ice.
  - 2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.
- D. Removal, Repair:
  - 1. Repair existing facilities damaged by use, to original condition.

#### 1.15 PROGRESS CLEANING AND WASTE REMOVAL

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in clean and orderly condition.



- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing spaces.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and rubbish from site weekly and dispose off-site.
- E. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.
- F. Refer to Section 01 74 00 – Cleaning and Waste Management for additional requirements.

1.16 PROJECT IDENTIFICATION – Not Used

1.17 TRAFFIC REGULATION – Not Used

1.18 FIRE PREVENTION FACILITIES

- A. Prohibit smoking within buildings under construction and demolition. Designate area on site where smoking is permitted. Provide approved ashtrays in designated smoking areas.
- B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.
- C. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.
  - 1. Provide one fire extinguisher on each floor of buildings under construction and demolition.
  - 2. Provide minimum one fire extinguisher in every construction trailer and storage shed.
  - 3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.19 BARRIERS

- A. Provide barriers to prevent unauthorized entry to construction areas and to protect existing facilities and adjacent properties from damage from construction operations.
- B. Provide protection for plants designated to remain. Replace damaged plants.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

1.20 ENCLOSURES AND FENCING

- A. Exterior Enclosures:
  - 1. Provide temporary weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

1.21 SECURITY

- A. Security Program:

1. Protect Work from theft, vandalism, and unauthorized entry.
  2. Initiate program at project mobilization.
  3. Maintain program throughout construction period until Owner acceptance precludes need for Contractor security.
- B. Entry Control:
1. Restrict entrance of persons and vehicles into Project site and existing facilities.
  2. Allow entrance only to authorized persons with proper identification.
  3. Maintain log of workers and visitors, make available to Owner on request.
  4. Owner will control entrance of persons and vehicles related to Owner's operations.
- C. Personnel Identification:
1. Provide identification badge to each person authorized to enter premises.
  2. Badge To Include: Personal photograph, name and employer.
  3. Maintain list of accredited persons, submit copy to Owner on request.
  4. Require return of badges at expiration of their employment on the Work.
- D. Restrictions:
1. Access to areas outside of Work Area are restricted. Coordinate access to areas outside of Work Area with Owner's existing security program.

#### 1.22 WATER CONTROL

- A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- B. Protect site from puddling or running water. Provide water barriers as required to protect site from.

#### 1.23 DUST CONTROL

- A. Execute Work by methods to minimize raising dust from construction operations.
- B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

#### 1.24 EROSION AND SEDIMENT CONTROL

- A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- B. Minimize surface area of bare soil exposed at one time.
- C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.
- D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
- E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- F. Refer to Section 01 57 13 – Temporary Erosion and Sedimentation Control for additional requirements.

1.25 NOISE CONTROL – Not Used

1.26 PEST CONTROL

- A. Provide methods, means, and facilities to prevent pests and insects from damaging the Work or entering facility.

1.27 POLLUTION CONTROL

- A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.
- B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.28 RODENT CONTROL

- A. Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.29 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

- A. Remove temporary utilities, equipment, facilities, materials, prior to Substantial Completion inspection.
- B. Remove underground installations to minimum depth of 2 feet. Grade site as indicated on Drawings.
- C. Clean and repair damage caused by installation or use of temporary work.
- D. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

**END OF SECTION**



**SECTION 01 57 13**

**TEMPORARY EROSION AND SEDIMENTATION CONTROL**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes work required to provide and maintain temporary soil erosion and sedimentation control.

**1.2 PERFORMANCE REQUIREMENTS**

- A. Permit: Obtain permit from local enforcing agency.
- B. Requirements: Comply with permit requirements.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Submit copy of Soil Erosion and Sedimentation Control Plan approved by authority having jurisdiction.
- C. Product Data: Submit data on soil erosion and sedimentation control products and devices.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Furnish materials in accordance with MDOT 208.02 standards and as approved by the regulating agency.

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Verify compacted Subgrade is acceptable and ready to support devices and imposed loads.
- B. Verify gradients and elevations of base or foundation for other work are correct.

**3.2 PERFORMANCE**

- A. Install Work in accordance with MDOT standards.
- B. Abide with all applicable rules and regulations as established by the local regulating agency in conjunction with Act 451 of 1994, Natural Resources and Environmental Protection Act, Part 91 as amended, and Michigan Soil Erosion and Sedimentation Control (formerly PA 347 of 1972, as amended).

- C. Incorporate erosion control measures indicated on the approved Drawings into the project at the earliest practicable time.
- D. Stabilize disturbed areas of affected erosion control devices on which activity has ceased and which will remain exposed for more than 20 days.
- E. Sedimentation Removal:
  - 1. Take such steps as are necessary to assure the retention and removal of any sediment which enters a drainage system before such drainage system discharges into a stream, pond, or lake.
  - 2. Sediment that enters a storm sewer system, catch basin, manhole, pipe or culvert shall be removed following completion of construction at Contractor's expense.
- F. Provide the following temporary soil erosion and sedimentation control measures in accordance with MDOT standards unless otherwise indicated on the approved Drawings:
  - 1. Excavated or borrow material stockpile: Place silt fence around stockpile in a manner to prevent soil erosion from entering a drainage system or leaving the site.
  - 2. Trench Backfill in place: Place silt fence across trenches, ditches, and around inlets to prevent soil erosion from entering a drainage system or leaving the site until:
    - a. Seed and mulch have been placed in non-paved areas; and
    - b. Aggregate has been placed in areas to be paved or left as gravel.
  - 3. Dewatering discharge: Place straw bales and/or siltation fencing staked in place at point of discharge, adequately anchored to prevent displacement.
  - 4. Grading limits: Place silt fence along down slope side of all areas disturbed by grading operations.
  - 5. Catch basins: Provide inlet protection around catch basins and below grates. Remove after turf is established.
  - 6. Culvert inlets: Place stone check dam and silt fence upstream of all culvert inlets.
  - 7. Drain cleanout: Excavate sediment basin and place stone check dam at downstream end prior to cleanout operation.
- G. Maintain temporary soil erosion and sedimentation control measures in accordance with MDOT standards.
- H. Remove soil erosion and sedimentation control measures after permanent soil stabilization measures are in place and established.

**END OF SECTION**

**SECTION 01 60 00**

**PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Products.
- B. Product delivery requirements.
- C. Product storage and handling requirements.
- D. Product options.
- E. Product substitution procedures.
- F. Equipment electrical characteristics and components.

**1.2 PRODUCTS**

- A. Furnish products of qualified manufacturers suitable for intended use. Furnish products of each type by single manufacturer unless specified otherwise.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by Contract Documents.
- C. Furnish interchangeable components from same manufacturer for components being replaced.

**1.3 PRODUCT DELIVERY REQUIREMENTS**

- A. Transport and handle products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to ensure products comply with requirements, quantities are correct, and products are undamaged.
- C. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

**1.4 PRODUCT STORAGE AND HANDLING REQUIREMENTS**

- A. Store and protect products in accordance with manufacturers' instructions.
- B. Store with seals and labels intact and legible.
- C. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.
- D. For exterior storage of fabricated products, place on sloped supports above ground.



- E. Provide bonded off-site storage and protection when site does not permit on-site storage or protection.
- F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- G. Store loose granular materials on solid flat surfaces in well-drained area. Prevent mixing with foreign matter.
- H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

#### 1.5 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of one of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with an "Or Equal" provision: Any Product meeting the quality standards or description. Pre-bid requests for approval of Products specified with an "or equal" provision will not be acknowledged. Acceptability of "or equal" Products will be determined by the Architect during the submittal process based upon the quality or suitability of the Product proposed.
- D. Products Specified by Naming One or More Manufacturers with Provision for Substitutions: Submit request for substitution for any manufacturer not named in accordance with the following article.

#### 1.6 PRODUCT SUBSTITUTION PROCEDURES

- A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during bidding period to requirements specified in this section.
- B. Post-Bid Substitutions will only be considered when a product becomes unavailable through no fault of Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that Bidder:
  - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
  - 2. Will provide same warranty for Substitution as for specified product.
  - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension which may subsequently become apparent.

- 5. Will reimburse Owner and/or Architect/Engineer for review or redesign services associated with re-approval by authorities having jurisdiction.
- E. Substitutions will not be considered when they are indicated or implied on Shop Drawing or Product Data submittals, without separate written request, or when acceptance will require revision to Contract Documents.

## PART 2 PRODUCTS

### 2.1 EQUIPMENT ELECTRICAL CHARACTERISTICS AND COMPONENTS

- A. Wiring Terminations: Furnish terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Include lugs for terminal box.
- B. Cord and Plug: Furnish minimum 6 foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

## PART 3 EXECUTION - Not Used

**END OF SECTION**

**SECTION 01 70 00**

**EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Closeout procedures.
- B. Final cleaning.
- C. Starting of systems.
- D. Demonstration and instructions.
- E. Testing, adjusting and balancing.
- F. Protecting installed construction.
- G. Project record documents.
- H. Operation and maintenance data.
- I. Manual for materials and finishes.
- J. Manual for equipment and systems.
- K. Spare parts and maintenance products.
- L. Product warranties and product bonds.
- M. Maintenance service.

**1.2 CLOSEOUT PROCEDURES**

- A. Submit certification that the work is Substantially Complete and approved for occupancy by the Authority Having Jurisdiction, and Contractor's list of items to be completed to the Architect.
- B. Architect will inspect the work and will prepare a Punch List of items to be corrected or completed for final acceptance of the work.
- C. Upon completion of all work and correction of items included on the Punch List prepared by the Architect, submit written certification that Contract Documents have been reviewed, and that Work is complete in accordance with Contract Documents and ready for Architect/Engineer's final review. Architect will visit the site and will verify that all items have been properly completed and/or corrected.
- D. Contractor shall reimburse the Owner for all re-inspection costs incurred as a result of Contractor's failure to complete and/or correct all items identified by the Architect. Charges to the Contractor shall be made at such times and in such amounts as the Architect invoices the Owner



under the rate schedule in effect at the time of service. Such charges to the Contractor will be deducted from the Contractor's progress payment or final payment as applicable.

- E. Provide submittals to Architect/Engineer required by authorities having jurisdiction.
- F. Submit final Application for Payment identifying total adjusted Contract Sum, previous payments, and sum remaining due.

### 1.3 FINAL CLEANING

- A. Execute final cleaning prior to final project assessment.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Clean equipment and fixtures to sanitary condition with cleaning materials appropriate to surface and material being cleaned.
- D. Replace filters of operating equipment.
- E. Clean debris from roofs, and drainage systems.
- F. Clean site; sweep paved areas, rake clean landscaped surfaces.
- G. Remove waste and surplus materials, rubbish, and construction facilities from site.

### 1.4 STARTING OF SYSTEMS

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Notify Architect/Engineer seven days prior to start-up of each item.
- C. Verify each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions which may cause damage.
- D. Verify tests, meter readings, and specified electrical characteristics agree with those required by equipment or system manufacturer.
- E. Verify wiring and support components for equipment are complete and tested.
- F. Execute start-up under supervision of applicable personnel in accordance with manufacturers' instructions.
- G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check, and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.
- H. Submit a written report in accordance with Section 01 33 00 - Submittal Procedures that equipment or system has been properly installed and is functioning correctly.

#### 1.5 DEMONSTRATION AND INSTRUCTIONS

- A. Demonstrate operation and maintenance of products to Owner's personnel two weeks prior to date of final inspection.
- B. Demonstrate Project equipment instructed by qualified manufacturer's representative who is knowledgeable about the Project.
- C. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.
- E. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed time, at equipment location.
- F. Prepare and insert additional data in operations and maintenance manuals when need for additional data becomes apparent during instruction.
- G. Required instruction time for each item of equipment and system is specified in individual sections.

#### 1.6 TESTING, ADJUSTING AND BALANCING

- A. Employ and pay for services of independent firm to perform testing, adjusting, and balancing.
- B. Independent firm will perform services specified in Section 23 05 93.
- C. Reports will be submitted by independent firm to Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with requirements of Contract Documents.

#### 1.7 PROTECTING INSTALLED CONSTRUCTION

- A. Protect installed Work and provide special protection where specified in individual specification sections.
- B. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- C. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- D. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- E. Prohibit traffic or storage upon waterproofed or roofed surfaces. When traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- F. Prohibit traffic from landscaped areas.

## 1.8 PROJECT RECORD DOCUMENTS

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed Shop Drawings, Product Data, and Samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress, not less than weekly.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.
  - 3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  - 1. Measured depths of foundations in relation to finish first floor datum.
  - 2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  - 4. Field changes of dimension and detail.
  - 5. Details not on original Contract drawings.
- G. Submit documents to Architect/Engineer with claim for final Application for Payment.

## 1.9 OPERATION AND MAINTENANCE DATA

- A. Submit data bound in 8-1/2 x 11 inch (A4) text pages, three D side ring binders with durable plastic covers.
- B. Prepare binder cover with printed title "OPERATION AND MAINTENANCE INSTRUCTIONS", title of project, and subject matter of binder when multiple binders are required.
- C. Internally subdivide binder contents with permanent page dividers, logically organized as described below; with tab titling clearly printed under reinforced laminated plastic tabs.
- D. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.
- E. Contents: Prepare Table of Contents for each volume, with each product or system description identified, typed on white paper, in three parts as follows:
  - 1. Part 1: Directory, listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.



2. Part 2: Operation and maintenance instructions, arranged by system and subdivided by specification section. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers. Identify the following:
  - a. Significant design criteria.
  - b. List of equipment.
  - c. Parts list for each component.
  - d. Operating instructions.
  - e. Maintenance instructions for equipment and systems.
  - f. Maintenance instructions for [special] finishes, including recommended cleaning methods and materials, and special precautions identifying detrimental agents.
3. Part 3: Project documents and certificates, including the following:
  - a. Shop drawings and product data.
  - b. Air and water balance reports.
  - c. Certificates.
  - d. Photocopies of warranties and bonds.

#### 1.10 MANUAL FOR MATERIALS AND FINISHES

- A. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- B. Submit two sets of revised final volumes in final form with claim for Final Application for Payment.
- C. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Include information for re-ordering custom manufactured products.
- D. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- E. Moisture Protection and Weather Exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. Include recommendations for inspections, maintenance, and repair.
- F. Additional Requirements: As specified in individual product specification sections.
- G. Include listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

#### 1.11 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit one copy of completed volumes 15 days prior to final inspection. Draft copy will be reviewed and returned, with Architect/Engineer comments. Revise content of document sets as required prior to final submission.
- B. Submit two sets of revised final volumes in final form with claim for Final Application for Payment.
- C. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and model number of replaceable parts.

- D. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- E. Include color coded wiring diagrams as installed.
- F. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and special operating instructions.
- G. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- H. Include servicing and lubrication schedule, and list of lubricants required.
- I. Include manufacturer's printed operation and maintenance instructions.
- J. Include sequence of operation by controls manufacturer.
- K. Include original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- L. Include control diagrams by controls manufacturer as installed.
- M. Include Contractor's coordination drawings, with color coded piping diagrams as installed.
- N. Include charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- O. Include list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- P. Include test and balancing reports as specified in Section 01 40 00 - Quality Requirements.
- Q. Additional Requirements: As specified in individual product specification sections.
- R. Include listing in Table of Contents for design data, with tabbed dividers and space for insertion of data.

#### 1.12 SPARE PARTS AND MAINTENANCE PRODUCTS

- A. Furnish spare parts, maintenance, and extra products in quantities specified in individual specification sections.
- B. Deliver to and place in location as directed by Owner; obtain receipt prior to final payment.
- C. Submit receipt for spare parts and maintenance products to Architect with claim for Final Application for Payment.

#### 1.13 PRODUCT WARRANTIES AND PRODUCT BONDS

- A. Obtain warranties and bonds executed in duplicate by responsible subcontractors, suppliers, and manufacturers, within ten days after completion of applicable item of work.
- B. Execute and assemble transferable warranty documents and bonds from subcontractors, suppliers, and manufacturers.
- C. Verify documents are in proper form, contain full information, and are notarized.
- D. Co-execute submittals when required.
- E. Include Table of Contents and assemble in three D side ring binder with durable plastic cover.
- F. Submit prior to final Application for Payment.
- G. Time Of Submittals:
  - 1. For equipment or component parts of equipment put into service during construction with Owner's permission, provide extended warranty for the full length of the warranty period beyond the Date of Substantial Completion.
  - 2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
  - 3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing date of acceptance as beginning of warranty or bond period.

#### 1.14 MAINTENANCE SERVICE – Not Used

#### PART 2 PRODUCTS - Not Used

#### PART 3 EXECUTION - Not Used

**END OF SECTION**



## **SECTION 02 41 19**

### **SELECTIVE STRUCTURE DEMOLITION**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Demolishing designated building equipment and fixtures.
  - 2. Demolishing designated construction.
  - 3. Cutting and alterations for completion of the Work.
  - 4. Removing designated items for reuse and/or Owner's retention.
  - 5. Protecting items designated to remain.
  - 6. Removing demolished materials.

##### **1.2 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of capped utilities, concealed utilities discovered during demolition, and subsurface obstructions.

##### **1.3 QUALITY ASSURANCE**

- A. Conform to applicable code for demolition work, dust control, products requiring electrical disconnection and re-connection.
- B. Conform to applicable code for procedures when hazardous or contaminated materials are discovered.
- C. Obtain required permits from authorities having jurisdiction.

##### **1.4 SCHEDULING**

- A. Section 01 30 00 - Administrative Requirements: Requirements for scheduling.
- B. Schedule Work to coincide with new construction.
- C. Cooperate with Owner in scheduling noisy operations and waste removal that may impact Owners operation in adjoining spaces.
- D. Coordinate utility and building service interruptions with Owner.
  - 1. Do not disable or disrupt building fire or life safety systems without three days prior written notice to Owner.
  - 2. Schedule tie-ins to existing systems to minimize disruption.
  - 3. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

##### **1.5 PROJECT CONDITIONS**

- A. Conduct demolition to minimize interference with adjacent [and occupied] building areas.

- B. Cease operations immediately if structure appears to be in danger and notify Architect/Engineer.  
Do not resume operations until directed.

## PART 2 PRODUCTS

Not Used.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Notify affected utility companies before starting work and comply with their requirements.
- B. Mark location and termination of utilities.
- C. Erect, and maintain temporary barriers and security devices, including warning signs and lights, and similar measures, for protection of the public, Owner, and existing improvements indicated to remain.
- D. Erect and maintain weatherproof closures for exterior openings.
- E. Erect and maintain temporary protection to prevent spread of dust, odors, and noise to permit continued Owner occupancy.
- F. Prevent movement of structure; provide temporary bracing and shoring required to ensure safety of existing structure.
- G. Provide appropriate temporary signage including signage for exit or building egress.
- H. Do not close or obstruct building egress path.
- I. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.

### 3.2 SALVAGE REQUIREMENTS

- A. Coordinate with Owner to identify building components and equipment required to be removed and delivered to Owner.
- B. Tag components and equipment Owner designates for salvage.
- C. Protect designated salvage items from demolition operations until items can be removed.
- D. Carefully remove building components and equipment indicated to be salvaged.
- E. Disassemble as required to permit removal from building.
- F. Package small and loose parts to avoid loss.

- G. Mark equipment and packaged parts to permit identification and consolidation of components of each salvaged item.
- H. Prepare assembly instructions consistent with disassembled parts. Package assembly instructions in protective envelope and securely attach to each disassembled salvaged item.
- I. Deliver salvaged items to Owner. Obtain signed receipt from Owner.

### 3.3 DEMOLITION

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Maintain protected egress from and access to adjacent existing buildings at all times.
- C. Cease operations immediately when structure appears to be in danger and notify Architect/Engineer.
- D. Disconnect and remove designated utilities within demolition areas.
- E. Cap and identify abandoned utilities at termination points when utility is not completely removed. Annotate Record Drawings indicating location and type of service for capped utilities remaining after demolition.
- F. Demolish in orderly and careful manner. Protect existing improvements, supporting structural members and items designated to remain.
- G. Carefully remove building components indicated to be reused.
  - 1. Disassemble components as required to permit removal.
  - 2. Package small and loose parts to avoid loss.
  - 3. Mark components and packaged parts to permit reinstallation.
  - 4. Store components, protected from construction operations, until reinstalled.
- H. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- I. Remove materials as Work progresses. Upon completion of Work, leave areas in clean condition.
- J. Remove temporary Work.

**END OF SECTION**



## **SECTION 03 10 00**

### **CONCRETE FORMING AND ACCESSORIES**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Formwork for cast-in place concrete.
  - 2. Shoring, bracing, and anchorage.
  - 3. Form stripping.
- B. Related Sections:
  - 1. Section 03 20 00 - Concrete Reinforcing.
  - 2. Section 03 11 19 – Insulating Concrete Forming: permanent forms for walls.
  - 3. Section 03 30 00 - Cast-In-Place Concrete.
  - 4. Section 32 13 13 - Concrete Paving.

##### **1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 117 - Standard Specifications for Tolerances for Concrete Construction and Materials.
  - 2. ACI 318 - Building Code Requirements for Structural Concrete.
  - 3. ACI 347 - Guide to Formwork for Concrete.
- B. American Forest and Paper Association:
  - 1. AF&PA - National Design Specifications for Wood Construction.

##### **1.3 DESIGN REQUIREMENTS**

- A. Design, engineer and construct formwork, shoring and bracing in accordance with ACI 318 to conform to design and applicable code requirements to achieve concrete shape, line and dimension as indicated on Drawings.

##### **1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on pre-fabricated form materials.

##### **1.5 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 347.
- B. For wood products furnished for work of this Section, comply with AF&PA.

##### **1.6 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

- B. Coordinate this Section with other sections of work, requiring attachment of components to formwork.

## PART 2 PRODUCTS

### 2.1 WOOD FORM MATERIALS

- A. Form Materials: At discretion of Contractor.

### 2.2 FORMWORK ACCESSORIES

- A. Form Release Agent: Colorless mineral oil that will not stain concrete, or absorb moisture.
  - 1. Manufacturers:
    - a. Arcal Chemical Corporation Arcal-80.
    - b. Industrial Synthetics Company Synthex.
    - c. Nox-Crete Company Nox-Crete Form Coating.
    - d. Substitutions: Or equal.
- B. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Size, strength and character to maintain formwork in place while placing concrete.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify lines, levels, and centers before proceeding with formwork. Verify dimensions agree with Drawings.
- C. When formwork is placed after reinforcement resulting in insufficient concrete cover over reinforcement before proceeding, request instructions from Architect/Engineer.

### 3.2 INSTALLATION

- A. Earth Forms:
  - 1. Earth forms are not permitted.
- B. Formwork - General:
  - 1. Provide top form for sloped surfaces steeper than 1.5 horizontal to 1 vertical to hold shape of concrete during placement, unless it can be demonstrated that top forms can be omitted.
  - 2. Construct forms to correct shape and dimensions, mortar-tight, braced, and of sufficient strength to maintain shape and position under imposed loads from construction operations.
  - 3. Camber forms where necessary to produce level finished soffits unless otherwise shown on Drawings.
  - 4. Carefully verify horizontal and vertical positions of forms. Correct misaligned or misplaced forms before placing concrete.
  - 5. Complete wedging and bracing before placing concrete.
- C. Forms for Smooth Finish Concrete:
  - 1. Use steel, plywood or lined board forms.

2. Use clean and smooth plywood and form liners, uniform in size, and free from surface and edge damage capable of affecting resulting concrete finish.
  3. Install form lining with close-fitting square joints between separate sheets without springing into place.
  4. Use full size sheets of form lines and plywood wherever possible.
  5. Tape joints to prevent protrusions in concrete.
  6. Use care in forming and stripping wood forms to protect corners and edges.
  7. Level and continue horizontal joints.
  8. Keep wood forms wet until stripped.
- D. Framing, Studding and Bracing:
1. Space studs at 16 inches on center maximum for boards and 12 inches on center maximum for plywood.
  2. Size framing, bracing, centering, and supporting members with sufficient strength to maintain shape and position under imposed loads from construction operations.
  3. Construct beam soffits of material minimum of 2 inches thick.
  4. Distribute bracing loads over base area on which bracing is erected.
  5. When placed on ground, protect against undermining, settlement or accidental impact.
- E. Erect formwork, shoring, and bracing to achieve design requirements, in accordance with requirements of ACI 318.
- F. Arrange and assemble formwork to permit dismantling and stripping. Do not damage concrete during stripping. Permit removal of remaining principal shores.
- G. Do not reuse wood formwork for concrete surfaces to be exposed to view after surface defects begin to appear. Do not patch formwork.

### 3.3 APPLICATION - FORM RELEASE AGENT

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.
- C. Do not apply form release agent where concrete surfaces are indicated to receive special finishes or applied coverings that are affected by agent. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.
- D. Reuse and Coating of Forms: Thoroughly clean forms and reapply form coating before each reuse. For exposed work, do not reuse forms with damaged faces or edges. Apply form coating to forms in accordance with manufacturer's specifications. Apply form coatings before placing reinforcing steel.

### 3.4 INSTALLATION - INSERTS, EMBEDDED PARTS, AND OPENINGS

- A. Install formed openings for items to be embedded in or passing through concrete work.
- B. Locate and set in place items required to be cast directly into concrete.
- C. Coordinate with Work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other Work.



- D. Arrangement: Arrange formwork to allow proper erection sequence and to permit form removal without damage to concrete.
- E. Embedded Items:
  - 1. Make provisions for pipes, sleeves, anchors, inserts, reglets, anchor slots, nailers, water stops, and other features.
  - 2. Do not embed wood or uncoated aluminum in concrete.
  - 3. Obtain installation and setting information for embedded items furnished under other Specification sections.
  - 4. Securely anchor embedded items in correct location and alignment prior to placing concrete.
  - 5. Verify conduits and pipes, including those made of coated aluminum, meet requirements of ACI 318 for size and location limitations.
- F. Screeds:
  - 1. Set screeds and establish levels for tops of concrete slabs and levels for finish on slabs.
  - 2. Slope slabs to drain where required or as shown on Drawings.
  - 3. Before depositing concrete, remove debris from space to be occupied by concrete and thoroughly wet forms. Remove freestanding water.

### 3.5 FORM CLEANING

- A. Clean forms as erection proceeds, to remove foreign matter within forms.
- B. Clean formed cavities of debris prior to placing concrete.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
- D. During cold weather, remove ice and snow from within forms. Do not use de-icing salts. Do not use water to clean out forms, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

### 3.6 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads and removal has been approved by Architect/Engineer.
- B. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.
- C. Store removed forms in manner that surfaces to be in contact with fresh concrete will not be damaged. Discard damaged forms.
- D. Leave forms in place for minimum number of days as specified in ACI 347.

### 3.7 ERECTION TOLERANCES

- A. Tolerances: Construct formwork to produce completed concrete surfaces within construction tolerances specified in ACI 117.

## END OF SECTION

## SECTION 03 11 19

### INSULATING CONCRETE FORMING

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes supply and installation of permanent insulating concrete forms as formwork, placement of steel reinforcement and placement of concrete into formwork.
- B. Related Sections:
  - 1. Section 03 10 00 – Concrete Forming and Accessories.
  - 2. Section 03 20 00 – Concrete Reinforcing.
  - 3. Section 03 30 00 – Cast-In-Place Concrete.

##### 1.2 REFERENCES

- A. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI 305 - Hot Weather Concreting.
  - 3. ACI 306 - Cold Weather Concreting.
  - 4. ACI 309 - Guide for Consolidation of Concrete.
  - 5. ACI 318 - Building Code Requirements for Structural Concrete.
  - 6. ACI 347 - Guide to formwork for Concrete.
- B. National Fire Protection Association (NFPA):
  - 1. NFPA 286: Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
- C. American Society for Testing and Materials (ASTM):
  - 1. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
  - 2. ASTM D1761 - Standard Test Methods for Mechanical Fasteners in Wood.
  - 3. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials.

##### 1.3 SYSTEM DESCRIPTION

- A. Provide insulating concrete form product which has been manufactured and installed to withstand concrete placement loads without defects, damage, or failure and such that the cast-in-place concrete wall is designed according to ACI 318 "Building Code Requirements for Reinforced Concrete."
- B. Furnish labor, materials, equipment, and services necessary for the complete and proper installation of all insulating concrete framework and related work, as shown on the drawings or specified herein, in accordance with all applicable requirements of the contract documents.
  - 1. Insulating concrete wall formwork consisting of two flat wall panels of flame retardant Type II expanded polystyrene (EPS) manufactured to a nominal 1.5 lbs/cu. ft. minimum density. The two EPS panels to be connected by 6 co-polymer polypropylene plastic tie inserts designed with cross members placed 8" o.c. horizontally and 8" o.c. vertically creating a symmetrical design enhancing installation efficiency and reducing product waste. Plastic tie inserts positioned perpendicular between the EPS panels. The ICF product to be modular or prefabricated factory assembled forms.

2. The ICF formwork to have consistent 2 5/8" thick EPS panels with a single row of rectangular interlocking projections and recesses designed for efficient installation with the modular ICF formwork having no top, bottom, left or right sides; which is a universal type of design. Straight and specialty blocks (90-degree corner, 45-degree corner, etc.) all possess the same design features and characteristics.
3. Plastic tie inserts designed to allow for additional reinforcement placement positions to comply with structural design. The rebar chair supports are two deep with a loose fit for contact splice connections.
4. Wall system to provide a forming cavity width of a minimum 4", 6", 8", 10" or 12" (as design requires). The cavity width shall be a consistent flat rectangular cross section for the full and half blocks.
5. Wall system plastic tie inserts to provide minimum 1.5" wide and 0.23" thick fastening strips @ 8" o.c. Fastening strips to be recessed beneath the EPS panel face 5/8" and run vertically full form height (16" for the standard Fox Block and 8" for the shorter Fox Half Block) to facilitate fastening both interior and exterior.
6. Wall system consisting of two EPS panels, concrete and exterior and interior finishes to provide a minimum R-23 insulation value.
7. EPS foam to provide maximum vapor permeation of 3.5 Perm-in.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Conform to the applicable building code requirements of regulatory agencies having jurisdiction.
- B. The ICF's EPS insulation boards shall either have a flame spread index of 25 or less and smoke developed index of 450 or less (per ASTM E84) or shall have passed a NFPA 286 test.
- C. Finished ICF wall assemblies shall provide fire resistance ratings tested and documented by an Accredited Third Party as follows:
  1. For concrete core thickness of 4-inches: 2 hour fire resistance rating.
- D. ICFs' Cross-Ties' Fastener Withdrawal and Lateral Shear Resistance in accordance with ICC-ES AC308, Acceptance criteria for Stay-in-Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls and ASTM D1761, Standard Test Methods/or Mechanical Fasteners in Wood.

#### 1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit ICF manufacturer's literature describing products and installation procedures.
- C. Test Reports: Contractor shall submit a copy of valid ICF Product's evaluation report demonstrating compliance with this Section and applicable Codes.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum five years documented experience.



- B. Contractor shall engage the services of an ICF Installer, or of an experienced ICF Technical Consultant, who has been trained in procedures for the correct installation of the specified ICF Product, for the duration of the work under this Section.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver products in original factory packaging, bearing listing and leveling identification of product, manufacturer and lot number.
- C. Handle ICFs with care not to damage or soil any of the components.
- D. Store ICFs in well-ventilated areas away from high heat, ignition sources, and soils that may contain insects, in manufacturer provided packaging/bundles to prevent damage & soiling and to protect ICFs from extended exposure to UV (sun)light (or provide similar protection for unpackaged ICFs).

#### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Use appropriate measures for protection when required to ensure proper concrete curing conditions in accordance with ACI 305 and ACI 306 during periods of weather where temperatures are above or below minimum specified by the governing or local building code for concrete.

#### 1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to installation.

#### 1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate work with affected trades for installation of items concealed with ICFs.

### PART 2 PRODUCTS

#### 2.1 MATERIALS

- A. Insulating Concrete Forms:
  - 1. Expanded Polystyrene (EPS) Insulation Board as per ASTM C578.
  - 2. Nominal 1.5 lbs./cu. ft. foam density.
  - 3. Maximum flame spread rating of 25 or less per ASTM E84.
  - 4. Maximum smoke development rating 450 or less per ASTM E84.
  - 5. Universal and reversible interlock design for successive courses to provide wall integrity and single corner form.
  - 6. Form Units to comply with following out to out dimensions and concrete core widths:
    - a. 9.25" Straight Forms (Full & Half Blocks):
      - 1) 4" Concrete Width: 48" L x 9.25" W x 16" H - 2 5/8" Thick EPS.

- b. 9.25" 90-degree Corners (Full & Half Blocks):
  - 1) 4" Concrete Width 38" x 22" L x 9.25" W x 16" H - 2 5/8" Thick EPS.

- B. Bracing, Alignment and Scaffold System:
  - 1. As an integral installation component of an insulating concrete form system, an adjustable metal scaffolding support and wall alignment system shall be provided.
  - 2. A device with adequate degrees of adjustment to ensure the completed insulating concrete form system walls are plumb after the placement and consolidation of concrete.
  - 3. An OSHA compliant scaffold support system to facilitate proper stacking of forms and placement of concrete.
  - 4. System adequate to reinforce and protect completed insulating concrete form installation prior to the attachment of structural elements to protect from wind damage.
- C. Concrete: As specified in Section 03 30 00.
- D. Reinforcing: As specified in Section 03 20 00.

## 2.2 ACCESSORIES

- A. Window or Door Opening Buck Materials: Fire Retardant Treated Wood as specified in Section 06 10 00.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify footing installation conforms to requirements of 1/4" within level and that steps or elevation changes in footings are in 8" or 16" height increments.
- C. Verify dimensions of lines, levels and centers against for-construction building plans before proceeding with formwork installation.
- D. Verify that reinforcing steel dowels are in place at specified centers along footing lengths.

### 3.2 PREPARATION

- A. Section 01 30 00 - Administrative Requirements: Prepare existing substrate to receive work of this section.
- B. Remove all loose aggregate and foreign substances prior to commencement of insulating concrete form system installation.

### 3.3 INSTALLATION – GENERAL

- A. Install ICF formwork, reinforcing steel, and concrete per design requirements and in strict accordance with ICF manufacturer's installation instructions and all applicable codes and standards including, but not limited to, ACI 301, ACI 309, ACI 318, and ACI 347.

- B. Install and adjust ICF Bracing System to ensure stability and alignment of ICFs and formwork during all phases of work. Provide additional support for ICFs, Window and Door Opening Bucks and formwork where necessary.
- C. Ensure all required and recommended installation procedures are followed. Specifically the ICF Installer shall assure cross checks with respect to layout, level and vertical alignment are performed adequately and regularly.

### 3.4 INSTALLATION – FORMWORK

- A. Install the ICFs in accordance with ICF manufacturer's installation instructions, in a running bond pattern assuring placement and alignment of cross-ties / attachment strips.
- B. Install and secure Window and Door Opening Bucks. If specified, assure that the bucks have been prepared for anchoring to concrete as specified.
- C. Secure bottom layer of ICFs against displacement from footing or slab.
- D. Install horizontal reinforcing steel, as specified, within ICFs. Assure reinforcement diameter, grade and positioning complies with engineering specifications and is installed in correct position of wall for each course placed and with lap-splices as specified.
- E. Install ICF Bracing System in strict accordance with ICF Bracing System manufacturer's installation instructions. Regularly check anchorage to ICF system as recommended by manufacturers, and for vertical alignment.
- F. Install reinforcing steel for lintels, as specified, over all wall openings.
- G. Install all sleeves, conduit, anchor bolts, hangars, embeds, and similar as specified.
- H. Install vertical reinforcing steel, as specified, within ICFs. Assure reinforcement diameter, grade and positioning complies with engineering specifications and is installed in correct position of wall with lap-splices as specified.
- I. Secure ICF corners, angles, T-walls and similar as necessary
- J. Secure top layer of ICFs against lateral movement along top edges.
- K. Clean formed cavities of all debris, snow, and ice prior to placing concrete. Flush with water above freezing-levels or use compressed air or other methods to remove remaining foreign matter. Ensure that water and debris drains to exterior through clean-out ports.
- L. Inspection before Concrete Placement: ICF Installer shall assure string lines are placed at top of all walls and the wall system is aligned for concrete placement; cross check and assure that all required service penetration sleeves, embed plates, anchor bolts, fittings, beam pocket preparations, as specified on drawings, are in place and secured prior to concrete placement.
- M. Concrete Placement: Place concrete and mechanically and internally vibrate per ACI standards after each concrete lift to assure full consolidation of concrete.



- N. ICF Bracing System, and scaffolding adjustment & removal: Maintain entire wall lengths are aligned to vertical plumb by string line and screeded to horizontal level for finished wall height as required prior to concrete set. Scaffolding and ICF Bracing System shall remain in place until top of wall is supported by roof construction, but no less than a period of seven days before removal.

### 3.5 INTERFACE WITH OTHER WORK

- A. Locate and set items to be cast directly into concrete.
- B. Provide formed openings, sleeves, pockets where required for items to be embedded in or to pass through concrete work.
- C. Coordinate with work of other trades in placing bolts, anchors, hangers, sleeves and any other inserts.
- D. Install components for wall, roof and/or floor connections as specified.
- E. Install all accessories in accordance with their manufacturer's instructions, straight, level and plumb. Secure items against displacement during the concrete placement.

### 3.6 FIELD QUALITY CONTROL

- A. Plumb, Straight, Square, and Level of all formwork and walls, before, during and after the concrete placement.
- B. Damaged ICFs: Installer shall clearly mark and segregate any damaged ICFs or ICF components to prevent their use in the project.

### 3.7 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean up and properly dispose of all debris remaining on job site related to the installation of the insulating concrete forms.

**END OF SECTION**

**SECTION 03 20 00**  
**CONCRETE REINFORCING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Reinforcing bars and fabric.
  - 2. Reinforcement accessories.
- B. Related Sections:
  - 1. Section 03 10 00 - Concrete Forming and Accessories.
  - 2. Section 03 11 19 - Insulating Concrete Forming.
  - 3. Section 03 30 00 - Cast-In-Place Concrete.
  - 4. Section 26 05 26 - Grounding and Bonding
  - 5. Section 32 13 13 - Concrete Paving.

**1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 318 - Building Code Requirements for Structural Concrete.
  - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. ASTM International:
  - 1. ASTM A184/A184M - Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.
  - 2. A185/A185M-07 Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
  - 3. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- C. American Welding Society:
  - 1. AWS D1.4 - Structural Welding Code - Reinforcing Steel.
- D. Concrete Reinforcing Steel Institute:
  - 1. CRSI - Manual of Standard Practice.
  - 2. CRSI - Placing Reinforcing Bars.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit product data on fibrous reinforcement.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with CRSI - Manual of Standard Practice.

## 1.5 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with placement of formwork, formed openings and other Work.

## PART 2 PRODUCTS

### 2.1 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, 60 ksi yield grade, deformed billet bars, uncoated finish.
- B. Deformed Bar Mats: ASTM A184/A184M; fabricated from ASTM A615/A615M 60 ksi yield strength, steel bars, unfinished.
- C. Welded Plain Wire Fabric: ASTM A185/A185M; in flat sheets; unfinished.

### 2.2 ACCESSORY MATERIALS

- A. Epoxy adhesive for embedment of reinforcing in previously placed concrete: Hilti THE 50 Transportation Epoxy.
- B. Tie Wire: Minimum 16 gage annealed type.
- C. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during concrete placement conditions including load bearing pad on bottom to prevent vapor retarder puncture.
- D. Special Chairs, Bolsters, Bar Supports, Spacers Adjacent to Weather Exposed Concrete Surfaces: Plastic-coated steel type; size and shape to meet Project conditions.

## PART 3 EXECUTION

### 3.1 PLACEMENT

- A. Place, support and secure reinforcement against displacement. Do not deviate from required position beyond specified tolerance.
- B. Do not displace or damage vapor retarder.
- C. Accommodate placement of formed openings.
- D. Space reinforcement bars with minimum clear spacing in accordance with ACI 318.
  - 1. Where bars are indicated in multiple layers, place upper bars directly above lower bars.
- E. Maintain concrete cover around reinforcement in accordance with ACI 318 as follows:
  - 1. Concrete cast against earth: 3 inches.
  - 2. Formed concrete surfaces exposed to earth, weather or water: 2 inches.



3. Formed concrete surfaces of walls, beams and columns not exposed to earth, weather or water: 1-1/2 inches.
  4. Slabs exposed to earth, weather or water: 1-1/2 inches.
  5. Slabs not exposed to earth, weather or water: 1 inch
- F. Splice reinforcing at points of minimum stress. Splicing of bars shall be in accordance with ACI 318.
- G. Epoxy adhesive for new bars into previous placed concrete: Drill holes to size recommended by adhesive manufacturer, to depth indicated in the Drawings. Clean holes, install adhesive, and set bars in accordance with adhesive manufacturer's installation instructions.
- H. Lap adjoining wire mesh no less than (1) full mesh space and lace securely with wire. Offset end laps in adjacent widths to prevent continuous splice.
- I. Welded wire fabric reinforcement shall be overlapped wherever successive mats are continuous in such a way that the overlap measured between outermost cross wires of each fabric sheet is not less than one full mesh spacing plus two inches. The fabric shall extend to within four (4) inches of concrete edges. It may extend through contraction joints where alternate wires are field cut. It shall be adequately supported during placement of concrete to insure proper position in the slab by use of supporting chairs or bolsters.
- J. Bond and ground reinforcement in accordance with requirements of Section 26 05 26.

**END OF SECTION**

## **SECTION 03 30 00**

### **CAST-IN-PLACE CONCRETE**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes cast-in-place concrete for the following:
  - 1. Strip and spread footings and foundation piers.
  - 2. Slabs on grade.
  - 3. Concrete fill for insulating concrete forming.
- B. Related Sections:
  - 1. Section 03 10 00 - Concrete Forming and Accessories: Formwork and accessories.
  - 2. Section 03 11 19 – Insulating Concrete Forming: Permanent forming for concrete walls.
  - 3. Section 03 20 00 - Concrete Reinforcing.
  - 4. Section 03 35 00 - Concrete Finishing.
  - 5. Section 03 39 00 - Concrete Curing.
  - 6. Section 07 90 00 - Joint Protection.
  - 7. Section 32 12 13 - Concrete Paving: Sidewalks and stoops.

##### **1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI 305 - Hot Weather Concreting.
  - 3. ACI 306.1 - Standard Specification for Cold Weather Concreting.
  - 4. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
  - 1. ASTM C31/C31M - Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  - 2. ASTM C33 - Standard Specification for Concrete Aggregates.
  - 3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - 4. ASTM C42/C42M - Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
  - 5. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
  - 6. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic Cement Concrete.
  - 7. ASTM C150 - Standard Specification for Portland Cement.
  - 8. ASTM C172 - Standard Practice for Sampling Freshly Mixed Concrete.
  - 9. ASTM C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
  - 10. ASTM C260 - Standard Specification for Air-Entraining Admixtures for Concrete.
  - 11. ASTM C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
  - 12. ASTM C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete.
  - 13. ASTM C1017/C1017M - Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
  - 14. ASTM C1064/C1064M - Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete.

15. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
16. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
17. ASTM E154 – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
18. ASTM E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs.
19. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Vapor Retarder Permeance: Maximum 0.1 perms when tested in accordance with ASTM E154.

### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on joint devices, attachment accessories , and admixtures.
- C. Design Data:
  1. Submit concrete mix design for each concrete strength. Submit separate mix designs when admixtures are required for the following:
    - a. Hot and cold weather concrete work.
    - b. Air entrained concrete work.
  2. Identify mix ingredients and proportions, including admixtures.

### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Project Record Documents: Accurately record actual locations of embedded utilities and components concealed from view in finished construction.

### 1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301 and ACI 318.
- B. Conform to ACI 305 when concreting during hot weather.
- C. Conform to ACI 306.1 when concreting during cold weather.
- D. Acquire cement and aggregate from one source for Work.

### 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Maintain concrete temperature after installation at minimum 50 degrees F for minimum 7 days.



## 1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

## PART 2 PRODUCTS

### 2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I – Normal and Type IA - Air Entraining.
- B. Normal Weight Aggregates: ASTM C33.
  - 1. Fine aggregate: size 2NS; clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.
  - 2. Intermediate Aggregates: sized in accordance with ACI 318.
  - 3. Coarse Aggregate: Maximum size in accordance with ACI 318.
  - 4. Aggregate shall be clean, uncoated, crushed stone, processed from natural rock or stone containing no clay, mud, loam, or foreign matter.
- C. Water: ACI 318; potable.

### 2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494/C494M.
- C. Fly Ash and Calcined Pozzolan: ASTM C618 Class F.
- D. Plasticizing: ASTM C1017/C1017M.

### 2.3 ACCESSORIES

- A. Bonding Agent: Three component, pre-proportioned, water based epoxy modified Portland cement bonding agent.
  - 1. Manufacturers:
    - a. Euclid Chemical Company Model Duralprep AC.
    - b. Substitutions: Or equal.
- B. Vapor Retarder: ASTM E1745 Class B; 15 mil thick clear polyethylene film; type recommended for below grade application. Furnish joint tape recommended by manufacturer.
  - 1. Manufacturers:
    - a. Global Plastics Model VaporBlock 15.
    - b. Substitutions: Or Equal.
- C. Non-Shrink Grout: ASTM C1107/C1107M; premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

## 2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler Type A: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/2 inch thick x full depth of slab.
- B. Joint Filler Type B: Closed cell polyethylene foam ; 1/2 inch thick with preset tear strip; All-purpose Roll Foam manufactured by Right Pointe or equal.
- C. Sealant and Primer: Type, as specified in Section 07 90 00.

## 2.5 CONCRETE MIX

- A. Select proportions for concrete in accordance with ACI 318 trial mixtures, field experience, or both.
- B. Concrete TYPE A:

Material and Property	Measurement
Compressive Strength (28 day)	3,500 psi
Cement Type	ASTM C150
Cement Content (minimum)	564 pounds/cu yd
Aggregate Type	Blended (fine, intermediate and coarse) - Normal weight
Water-Cement Ratio (maximum)	.45 by weight
Air Content	Not air entrained
Fly Ash Content:	None
Slump	5 inches plus or minus 1/2 inch

- C.

D. Concrete TYPE B:

Material and Property	Measurement
Compressive Strength (28 day)	3,500 psi
Cement Type	ASTM C150
Cement Content (minimum)	564 pounds/cu yd
Aggregate Type	Blended (fine, intermediate and coarse) - Normal weight, maximum aggregate size = 3/8"
Water-Cement Ratio (maximum)	.45 by weight
Air Content	Not air entrained
Fly Ash Content:	None
Slump	6 inches plus or minus 1/2 inch with super plasticizer / mid range water reducer agent.

E. Concrete TYPE C:

Material and Property	Measurement
Compressive Strength (28 day)	3,500 psi
Cement Type	ASTM C150
Cement Content (minimum)	564 pounds/cu yd
Aggregate Type	Normal weight
Water-Cement Ratio (maximum)	.45 by weight
Air Content	4 to 6 percent where exposed to freeze-thaw or de-icing chemicals
Fly Ash Content:	20 percent of cementitious materials by weight, maximum
Slump	4 inches plus or minus 1 inch



F. Concrete TYPE D:

Material and Property	Measurement
Compressive Strength (28 day)	4,500 psi
Cement Type	ASTM C150
Cement Content (minimum)	564 pounds/cu yd
Aggregate Type	Normal weight
Water-Cement Ratio (maximum)	.45 by weight
Air Content	4 to 7 percent where exposed to freeze-thaw or de-icing chemicals per ACI 318 based upon maximum aggregate size.
Fly Ash Content:	20 percent of cementitious materials by weight, maximum
Slump	4 inches plus or minus 1 inch

- G. Admixtures: Include admixture types and quantities indicated in concrete mix designs only when approved by Architect/Engineer.
1. Use accelerating admixtures in cold weather. Use of admixtures will not relax cold weather placement requirements.
  2. Do not use calcium chloride nor admixtures containing calcium chloride.
  3. Use set retarding admixtures during hot weather.
  4. Add air entrainment admixture to concrete mix for work exposed to freezing and thawing or deicing chemicals.
  5. For concrete exposed to deicing chemicals, limit fly ash, pozzolans, silica fume, and slag content as required by applicable code.
- H. Average Compressive Strength Reduction: Not permitted.
- I. Ready Mixed Concrete: Mix and deliver concrete in accordance with ASTM C94/C94M.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not interfere with placing concrete.

### 3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Remove laitance, coatings, and unsound materials.
- B. Remove debris and ice from formwork, reinforcement, and concrete substrates.
- C. Remove water from areas receiving concrete before concrete is placed.

### 3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 318.
- B. Notify testing laboratory minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- D. Install vapor retarder under interior slabs on grade in accordance with ASTM E1643. Lap joints minimum 6 inches and seal watertight by adhesive applied between overlapping edges and ends or by taping edges and ends with vapor retarder manufacturer recommended tape.
- E. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lap over damaged areas minimum 6 inches and seal watertight.
- F. Separate slabs on grade from vertical surfaces with specified joint filler. Use Type A joint filler in slabs scheduled to receive overlay finish; Use Type B joint filler in slabs to be polished, or to remain exposed to view.
- G. Apply sealants in joint devices in accordance with Section 07 90 00. Apply sealants in joints in polished concrete floor after completion of polishing.
- H. Deposit concrete at final position. Prevent segregation of mix.
- I. Place concrete in continuous operation for each panel or section determined by predetermined joints.
- J. Consolidate concrete.
- K. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- L. Place concrete continuously between predetermined expansion, control, and construction joints.
- M. Do not interrupt successive placement; do not permit cold joints to occur.
- N. Screed floors and slabs on grade level, maintaining overall surface flatness in accordance with Section 033500.
- O. Saw cut joints control joints within 12 hours after placing to pattern indicated in Plans (Generally 10' maximum on center spacing each way). Use saw blade with triangular arbor configuration to reduce edge raveling or dislodging aggregates, cut to 1/4 depth of slab thickness.

### 3.4 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed with smooth rubbed finish.
- B. Finish concrete floor surfaces to requirements of Section 03 35 00.

### 3.5 CURING AND PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
  - 1. Protect concrete footings from freezing for minimum 5 days.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Cure floor surfaces as specified in Section 03 39 00.

### 3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Field inspection and testing will be performed by testing laboratory in accordance with ACI 318.
- C. Provide free access to Work and cooperate with appointed firm.
- D. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- E. Strength Test Samples:
  - 1. Sampling Procedures: ASTM C172.
  - 2. Cylinder Molding and Curing Procedures: ASTM C31/C31M, cylinder specimens, standard cured.
  - 3. Sample concrete and make one set of three cylinders for every 50 cu yds or less of each class of concrete placed each day and for every 5,000 sf of surface area for slabs and walls.
  - 4. When volume of concrete for any class of concrete would provide less than 5 sets of cylinders, take samples from five randomly selected batches, or from every batch when less than 5 batches are used.
  - 5. Make one additional cylinder during cold weather concreting, and field cure.
- F. Field Testing:
  - 1. Slump Test Method: ASTM C143/C143M.
  - 2. Air Content Test Method: ASTM C231.
  - 3. Temperature Test Method: ASTM C1064/C1064M.
  - 4. Measure slump, and temperature for each concrete load at point of delivery.
  - 5. Measure air content in air entrained concrete for each concrete load at point of delivery.
- G. Cylinder Compressive Strength Testing:
  - 1. Test Method: ASTM C39/C39M.
  - 2. Test Acceptance: In accordance with ACI 318.
  - 3. Test one cylinder at 7 days.
  - 4. Test two cylinders at 28 days.
- H. Core Compressive Strength Testing:



1. Sampling and Testing Procedures: ASTM C42/C42M.
  2. Test Acceptance: In accordance with ACI 318.
  3. Drill three cores for each failed strength test from concrete represented by failed strength test.
- I. Maintain records of concrete placement. Record date, location, quantity, air temperature and test samples taken.

### 3.7 PATCHING

- A. Allow Architect/Engineer to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify Architect/Engineer upon discovery.
- C. Do not patch, fill, touch-up, or repair concrete to remain exposed to view except upon express direction of Architect/Engineer for each repair.
- D. Do not patch, fill, touch-up, or repair concrete scheduled to be polished except upon express direction of Architect/Engineer. Consult Concrete Polishing Contractor for recommendations for patching concrete to be polished.
- E. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removal of forms, but only when acceptable to Architect.
1. Cut out honeycomb, rock pockets, voids over 1/2 inch diameter, and holes left by tie rods and bolts, down to solid concrete but, in no case to a depth of less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Before placing cement mortar, thoroughly clean, dampen with water, and brush-coat the area to be patched with neat cement grout. Proprietary patching compounds may be used when acceptable to the Architect.
  2. For exposed-to-view surfaces, blend white portland cement and standard portland cement so that, when dry, patching mortar will match color of surrounding. Provide test areas at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surfaces.
- F. Repair of Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects, as such, include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, and holes left by tie rods and bolts; fins and other projections on surface; and stains and other discolorations that cannot be removed by cleaning.
1. Repair concealed formed surfaces, where possible, that contain defects that adversely affect the durability of the concrete. If defects cannot be repaired, remove and replace the concrete.
- G. Repair of unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and to verify surface plane to tolerances specified for each surface and finish. Correct low and high areas as herein specified. Test unformed surfaces sloped to drain for trueness of slope, in addition to smoothness, using a template having required slope.
1. Repair finished unformed surfaces that contain defects which adversely affect durability of concrete. Surface defects, as such, include crazing, cracks, in excess of 0.01 inch wide or which penetrate to reinforcement or completely through non-reinforced sections regardless of width, spalling, pop-outs, honeycomb, rock pockets, and other objectionable conditions.
  2. Correct high areas in unformed surfaces by grinding, after concrete has cured at least 14 days.

3. Correct low areas in unformed surfaces during or immediately after completion of surface finishing operations by cutting out low areas and replacing with fresh concrete. Finish repaired areas to blend into adjacent concrete. Proprietary patching compounds may be used when acceptable to Architect.
4. Repair defective areas, except random cracks and single holes not exceeding one inch diameter, by cutting out and replacing with fresh concrete. Remove defective areas to sound concrete with clean, square cuts and expose reinforcing steel with at least 3/4 inch clearance. Dampen concrete surfaces in contact with patching concrete and brush with a neat cement grout coating or concrete bonding agent. Place patching concrete before grout takes its initial set. Mix patching concrete of same materials to provide concrete of the same type or class as original concrete. Place, compact and finish to blend with adjacent finished concrete. Cure in the same manner as adjacent concrete.
5. Repair isolated random cracks and single holes not over one inch in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt and loose particles. Dampen cleaned concrete surfaces and brush with neat cement grout coating. Place dry-pack before cement grout takes its initial set. Mix dry-pack before cement grout takes its initial set. Mix dry-pack, consisting of one part Portland cement to 2-1/2 parts fine aggregate using a No. 16 mesh sieve, using only enough water as required for handling and placing. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched areas continuously moist for not less than 72 hours.

### 3.8 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by Architect/Engineer.

### 3.9 SCHEDULES

- A. Concrete for interior floor slabs-on-grade: TYPE A.
- B. Concrete for insulating concrete formed walls: TYPE B.
- C. Concrete for building footings surrounding conditioned spaces: TYPE C.
- D. Concrete for portico footings subject to freeze thaw: TYPE D.
- E. Concrete for exterior stoops and sidewalks: Type C.

**END OF SECTION**

**SECTION 03 35 00**  
**CONCRETE FINISHING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Finishing concrete floors.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete: Prepared concrete floors ready to receive finish.
  - 2. Section 03 39 00 - Concrete Curing.
  - 3. Section 07 90 00 - Joint Protection.

**1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
- B. ASTM International:
  - 1. ASTM E1155 - Standard Test Method for Determining Floor Flatness and of Levelness Using the F-number System.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on concrete hardener, compatibilities, and limitations.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 301 and ACI 302.1.

**1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver materials in manufacturer's packaging including application instructions.



## 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Maintain ambient temperature of 50 degrees F minimum.

## 1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate the Work with concrete floor placement and concrete floor curing.

## PART 2 PRODUCT – Not Used

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify floor surfaces are acceptable to receive the Work of this section.

### 3.2 FLOOR FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.1.
- B. Steel trowel surfaces receiving overlay floor finish (carpeting, resilient flooring, seamless flooring, fluid applied flooring, thin-set floor tile).
- C. Steel trowel surfaces which are scheduled to be exposed.
- D. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains at 1/8 inch per foot nominal as indicated on Drawings.

### 3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Measure for FF and FL tolerances for floors in accordance with ASTM E1155, within 48 hours after slab installation.
- C. Finish concrete to achieve the following tolerances:
  - 1. Concrete floors scheduled to be polished: FF 35 and FL 25.
- D. Correct slab surface when actual FF or FL number for floor installation measures less than required.

- E. Correct defects in defined traffic floor by grinding or removal and replacement of defective Work. Areas requiring corrective Work will be identified. Re-measure corrected areas by same process.

**END OF SECTION**

**SECTION 03 39 00**  
**CONCRETE CURING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes initial and final curing of horizontal and vertical concrete surfaces.
- B. Related Sections:
  - 1. Section 03 30 00 - Cast-In-Place Concrete.
  - 2. Section 03 35 00 - Concrete Finishing.

**1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete.
  - 2. ACI 302.1 - Guide for Concrete Floor and Slab Construction.
  - 3. ACI 308.1 - Standard Specification for Curing Concrete.
  - 4. ACI 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International:
  - 1. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.
  - 2. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - 3. ASTM C1315 - Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
  - 4. ASTM D2103 - Standard Specification for Polyethylene Film and Sheeting.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on curing compounds, mats, compatibilities, and limitations.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 301, ACI 302.1 and ACI 318.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver curing materials in manufacturer's packaging including application instructions.



## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Membrane Curing Compound: ASTM C309, Type 1, Class A or ASTM C1315 Type 1, Class A.
- B. Absorptive Mats burlap-polyethylene, minimum 9 oz/sq yd bonded to prevent separation during handling and placing.
- C. Water: Potable, not detrimental to concrete.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces are ready to be cured.

### 3.2 INSTALLATION - HORIZONTAL SURFACES

- A. Cure concrete in accordance with ACI 308.1.
- B. Ponding: Maintain 100 percent coverage of water over floor slab areas, continuously for 4 days.
- C. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
- D. Absorptive Mat: Spread cotton fabric over floor slab areas. Spray with water until mats are saturated, and maintain in saturated condition for 7 days.
- E. Absorptive Mat: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides; maintain in place for 7 days.
- F. Membrane Curing Compound: Apply curing compound in one coat.

### 3.3 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished Work.
- B. Do not permit traffic over unprotected floor surface.

### 3.4 SCHEDULES

- A. Floor slabs schedule to receive concrete overlay, topping or applied floor finish: Cure by ponding, spraying or absorptive mats.
- B. Exterior Concrete Pavement: Membrane curing compound.

**END OF SECTION**

**SECTION 04 05 03**

**MASONRY MORTARING AND GROUTING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes mortar and grout for masonry.
- B. Related Sections:
  - 1. Section 04 20 00 - Unit Masonry: Installation of mortar and grout.
  - 2. Section 08 12 14 - Standard Steel Frames: Grouting steel door frames set in masonry.

**1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 530 - Building Code Requirements for Masonry Structures.
  - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. ASTM International:
  - 1. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete.
  - 2. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.
  - 3. ASTM C150 - Standard Specification for Portland Cement.
  - 4. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
  - 5. ASTM C270 - Standard Specification for Mortar for Unit Masonry.
  - 6. ASTM C387/C387M - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete.
  - 7. ASTM C404 - Standard Specification for Aggregates for Masonry Grout.
  - 8. ASTM C476 - Standard Specification for Grout for Masonry.
  - 9. ASTM C780 - Standard Test Method for Preconstruction and Construction Evaluation of Mortars for Plain and Reinforced Unit Masonry.
  - 10. ASTM C1019 - Standard Test Method for Sampling and Testing Grout.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Design Data: Submit design mix when Property specification of ASTM C270 is to be used, required environmental conditions, and admixture limitations.
- C. Test Reports:
  - 1. Submit reports on mortar indicating conformance of mortar to property requirements of ASTM C270 and test and evaluation reports to ASTM C780 for aggregate ratio and water content, air content, consistency and compressive strength.
  - 2. Submit reports on grout indicating conformance of grout to property requirements of ASTM C476 and test and evaluation reports to ASTM C1019.
- D. Manufacturer's Installation Instructions: Submit premix mortar manufacturer's installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 and ACI 530.1.

#### 1.5 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

### PART 2 PRODUCTS

#### 2.1 MORTAR AND MASONRY GROUT COMPONENTS

- A. Portland Cement: ASTM C150, Type I, gray color.
- B. Mortar Aggregate: ASTM C144, standard masonry type.
- C. Hydrated Lime: ASTM C206, Type S.
- D. Grout Aggregate: ASTM C404, fine and coarse.
- E. Water: Clean and potable.
- F. Calcium chloride is not permitted.

#### 2.2 MIXES

- A. Pre-packaged Mortar and Grout Mixes: ASTM C387/387M; At Contractor's option use pre-packaged Mortar and Grout Mixes meeting specified requirements as manufactured by Spec Mix or equal. Mix and install pre-packaged mortar and grout mixes in accordance with manufactures instructions.
- B. Mortar Mixes:
  - 1. Mortar For Structural Masonry and Masonry in contact with earth: ASTM C270, Type M using Property specification.
  - 2. Mortar For Non-Structural Masonry: ASTM C270, Type S using Property specification.
  - 3. Pointing Mortar: ASTM C270, Type N using Property specification.
- C. Mortar Mixing:
  - 1. Thoroughly mix mortar ingredients in accordance with ASTM C270 in quantities needed for immediate use.
  - 2. Achieve uniformly damp sand immediately before mixing process.
  - 3. Add mortar color to achieve uniformity of mix and coloration.
  - 4. Re-temper only within two hours of mixing.
- D. Grout Mixes:

1. Grout for Bond Beams, Lintels, Structural Masonry, and Filled Masonry: 2,000 psi strength at 28 days; 8-11 inches slump; mixed in accordance with ASTM C476 for Fine and Coarse grout.
  2. Application:
    - a. Coarse Grout: For grouting spaces with minimum 4 inches dimension in every direction.
    - b. Fine Grout: For grouting other spaces.
- E. Grout Mixing:
1. Transit mix grout in accordance with ASTM C94/C94M, modified to use ingredients complying with ASTM C476.
  2. Site Mixed Grout: Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C476.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Request inspection of spaces to be grouted.

#### 3.2 PREPARATION

- A. Brace masonry for wet grout pressure.

#### 3.3 INSTALLATION

- A. Install mortar and grout in accordance with ACI 530.1 Specifications for Masonry Structures.

**END OF SECTION**



## **SECTION 04 20 00**

### **UNIT MASONRY**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes concrete masonry units; reinforcement, anchorage, and accessories.
- B. Related Sections:
  - 1. Section 03 20 00 – Concrete Reinforcing: Reinforcing for masonry.
  - 2. 04 05 03 - Masonry Mortaring and Grouting: Mortar and grout.
  - 3. Section 07 84 00 - Firestopping: Firestopping at penetrations of masonry work.

##### **1.2 REFERENCES**

- A. American Concrete Institute:
  - 1. ACI 530 - Building Code Requirements for Masonry Structures.
  - 2. ACI 530.1 - Specifications for Masonry Structures.
- B. ASTM International:
  - 1. ASTM A615/A615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 2. ASTM A951/A951M - Standard Specification for Steel Wire for Masonry Joint Reinforcement.
  - 3. ASTM C90 - Standard Specification for Loadbearing Concrete Masonry Units.
  - 4. ASTM C140 - Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units.
  - 5. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 6. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

##### **1.3 PERFORMANCE REQUIREMENTS**

- A. Concrete Masonry Compressive Strength (f'm): 1,500 psi; determined by unit strength method.
  - 1. Concrete Masonry Units: 1,900 psi minimum net area compressive strength.

##### **1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal requirements.
- B. Product Data:
  - 1. Submit data for masonry units and fabricated wire reinforcement.
- C. Samples: Submit samples of decorative block units to illustrate color, texture and extremes of color range.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

## 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 530 Building Code Requirements for Masonry Structures and ACI 530.1 Specification for Masonry Structures.
- B. Fire Rated Wall Construction: Rating as indicated on Drawings.
  - 1. Tested Rating: Determined in accordance with ASTM E119.

## 1.6 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

## 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Cold Weather Requirements: In accordance with ACI 530.1 when ambient temperature or temperature of masonry units is less than 40 degrees F.
- C. Hot Weather Requirements: In accordance with ACI 530.1 when ambient temperature is greater than 100 degrees F or ambient temperature is greater than 90 degrees F with wind velocity greater than 8 mph.

## 1.8 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate masonry work with installation of standard steel frames.

# PART 2 PRODUCTS

## 2.1 COMPONENTS

- A. Hollow Concrete Masonry Units (CMU) for Above Grade Applications: ASTM C90; light weight.
- B. Hollow Concrete Masonry Units (CMU) for below Grade Applications: ASTM C90; normal weight.
- C. Concrete Masonry Unit Shape: Furnish bull-nosed units as indicated at wall openings, and special units for bond beams and lintels.

## 2.2 ACCESSORIES

- A. Single Wythe Joint Reinforcement: ASTM A951/A951M; truss type; steel; 0.148 inch diameter side rods with 0.148 inch diameter cross ties; hot dip galvanized.
- B. Reinforcing Steel: As specified in Section 03 20 00.
- C. Reinforcing Steel Positioning Devices: Single or Double O-ring type, 0.148 inch diameter; mill galvanized.
- D. Mortar and Grout: As specified in Section 04 05 03.

- E. Cleaning Solution: Not harmful to masonry work or adjacent materials.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: coordination and project conditions.
- B. Verify field conditions are acceptable and are ready to receive work.
- C. Verify items provided by other sections of work are properly sized and located.
- D. Verify built-in items are in proper location, and ready for roughing into masonry work.

### 3.2 PREPARATION

- A. Furnish temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent support.

### 3.3 INSTALLATION

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form bed and head joints of uniform thickness.
- C. Coursing of Concrete Masonry Units:
  - 1. Bond: Running.
  - 2. Coursing: One unit and one mortar joint to equal 8 inches.
  - 3. Mortar Joints: Concave.
- D. Placing And Bonding:
  - 1. Lay hollow masonry units with face shell bedding on head and bed joints.
  - 2. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
  - 3. Remove excess mortar as work progresses.
  - 4. Interlock intersections and external corners.
  - 5. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment is required, remove mortar and replace.
  - 6. Perform job site cutting of masonry units with proper tools to assure straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- E. Joint Reinforcement And Anchorage - Single Wythe Masonry:
  - 1. Install horizontal joint reinforcement 16 inches oc.
  - 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
  - 3. Lap joint reinforcement ends minimum 6 inches.
- F. Lintels:
  - 1. Install reinforced unit masonry lintels over openings where indicated.
  - 2. Size reinforced unit masonry lintels as indicated in Plans. Where not shown, provide reinforced unit masonry lintels as follows:
    - a. Openings Up To 42 inches Wide: Place two, No. 4 reinforcing bars 1 inch from bottom web.

- b. Openings From 42 inches Up To 78 inches Wide: Place two No. 5 reinforcing bars 1 inch from bottom web.
  - c. Openings Over 78 inches: Consult Architect/Engineer for lintel size and reinforcing requirements
- 3. Do not splice reinforcing bars.
- 4. Support and secure reinforcing bars from displacement.
- 5. Place and consolidate grout fill without displacing reinforcing.
- 6. Allow masonry lintels to attain specified strength before removing temporary supports.
- 7. Maintain minimum 8 inch bearing on each side of opening.
- G. Grouted Components:
  - 1. Reinforce bond beam with 2, No. 4 bars, 1 inch from bottom web unless noted otherwise in Plans.
  - 2. Lap splices bar diameters required by code.
  - 3. Support and secure reinforcing bars from displacement.
  - 4. Place and consolidate grout fill without displacing reinforcing.
  - 5. At bearing locations, reinforce and fill masonry cores with grout both sides of opening as shown in Plans.
- H. Reinforced Masonry:
  - 1. Lay masonry units with core vertically aligned and cavities clear of mortar and unobstructed.
  - 2. Place reinforcement bars as indicated on Drawings.
  - 3. Splice reinforcement in accordance with Section 03 20 00.
  - 4. Support and secure reinforcement from displacement.
  - 5. Place and consolidate grout fill without displacing reinforcing.
  - 6. Place grout in accordance with ACI 530.1 Specification for Masonry Structures.
- I. Built-In Work:
  - 1. As work progresses, install built-in metal door frames, anchor bolts, and other items to be built-in the work and furnished by other sections.
  - 2. Install built-in items plumb and level.
  - 3. Bed anchors of metal door frames in adjacent mortar joints. Fill frame voids solid with grout or mortar. Fill adjacent masonry cores with grout as detailed in Drawings.
  - 4. Do not build in materials subject to deterioration.
- J. Cutting And Fitting:
  - 1. Cut and fit for chases, pipes, conduit, sleeves, and grounds. Coordinate with other sections of work to provide correct size, shape, and location.
  - 2. Obtain Architect/Engineer's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

### 3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.



- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.
- H. Maximum Variation for Steel Reinforcement:
  - 1. Install reinforcement within the tolerances specified in ACI 530.1 for foundation walls.
  - 2. Plus or minus 1/2 inch when distance from centerline of steel to opposite face of masonry is 8 inches or less.
  - 3. Plus or minus 1 inch when distance is between 8 and 24 inches.
  - 4. Plus or minus 1-1/4 inch when distance is greater than 24 inches.
  - 5. Plus or minus 2 inches from location along face of wall.

### 3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove excess mortar and mortar smears as work progresses.
- C. Replace defective mortar. Match adjacent work.
- D. Clean soiled surfaces with cleaning solution.
- E. Use non-metallic tools in cleaning operations.

### 3.6 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect exposed external corners subject to damage.
- C. Protect base of walls from mud and mortar splatter.
- D. Protect masonry and other items built into masonry walls from mortar droppings and staining caused by mortar.
- E. Protect tops of masonry work with waterproof coverings secured in place without damaging masonry. Provide coverings where masonry is exposed to weather when work is not in progress.

**END OF SECTION**

**SECTION 04 72 00**

**CAST STONE MASONRY**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Manufactured stone veneer, Manufactured stone trim, and application materials.
- B. Related Sections:
  - 1. Section 03 11 19 – Insulating Concrete Forms: Formed wall substrate.
  - 2. Section 07 62 00 – Sheet Metal Flashing and Trim: Flashing materials.

**1.2 REFERENCES**

- A. American Concrete Institute (ACI).
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
  - 2. ASTM C67, Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile.
  - 3. ASTM C177, Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
  - 4. ASTM C192, Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
  - 5. ASTM C270, Standard Specification for Mortar for Unit Masonry.
  - 6. ASTM C482, Standard Test Method for Bond Strength of Ceramic Tile to Portland Cement.
  - 7. ASTM D226, Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 8. ASTM E2556/ E2556M Standard Specification for Vapor Permeable Flexible Sheet Water Resistive Barriers Intended for Mechanical Attachment.
- C. Building Materials Evaluation Commission.
- D. International Code Council (ICC):
  - 1. ES Report.
- E. Masonry Standards Joint Committee (MSJC) of The Masonry Society.
- F. Underwriters Laboratories (UL):
  - 1. UL 723, Standard for Safety for Surface Burning Characteristics of Building Materials.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Manufactured masonry and application materials including mortar color charts, and water resistive barrier.

- C. Samples: Panel containing full-size samples of specified manufactured masonry showing full range of colors and textures complete with specified mortar.
  - 1. Actual size of masonry sample approximately 36 by 36 inches.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Maintenance Instructions.

#### 1.5 QUALIFICATIONS

- A. Manufacturer Qualifications:
  - 1. Minimum five years experience in producing manufactured masonry.
  - 2. Member of following organizations:
    - a. MSJC.
    - b. ACI.
    - c. ASTM.
- B. Installer Qualifications: Company with documented experience in installation of manufactured masonry including minimum 5 projects within 400 mile radius of this Project.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Follow manufacturer's instructions for delivery, storage and handling.
- C. Store moisture-sensitive materials in weather protected enclosures.

#### 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Maintain materials and ambient temperature in area of installation at minimum 40 degrees F (4 degrees C) prior to, during, and for 48 hours following installation.

#### 1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Provide manufacturer's standard limited warranty against defects in manufacturing for a period of 50 years following date of Substantial Completion.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURER

- A. Boral Stone Product LLC, 2256 Centennial Road, Toledo, OH 43617, telephone (800) 255-1727.

- B. Substitutions permitted.

## 2.2 CAST STONE MATERIALS

- A. Textures:
  - 1. Single Texture Color: Stream Stone to match existing.
- B. Architectural Trim:
  - 1. Watertable/Sill – Stone Textured:
    - a. Color: Match existing.
    - b. Size: Match existing.
    - c. Provide sloped top surface and drip edge.
- C. Physical Properties:
  - 1. Compressive Strength: ASTM C192 and ASTM C 39, 1800 psi.
  - 2. Bond Between Stone Unit, Type S Mortar, and Backing: ASTM C482, 50 psi.
  - 3. Thermal Resistance: ASTM C177, R-factor, 0.355 per inch of thickness.
  - 4. Freeze/Thaw: ASTM C67, 50 cycles, no disintegration and less than 3 percent weight loss.
  - 5. Fire Hazard Test, UL 723:
    - a. Flame spread: 0.
    - b. Smoke Development: 0.
  - 6. Maximum Veneer Unit Weight: 15 psf.

## 2.3 ACCESSORIES

- A. Water Resistive Barrier: No. 15, Type I, asphalt saturated felt, ASTM D226.
- B. Metal Lath: 2.5 lb galvanized expanded metal lath.
- C. Fasteners: 1-1/2" long, corrosion-resistant, self tapping, pancake head screws with lath washer. Screws shall be of sufficient length to penetrate through internal continuous nailing strips embedded in ICF's at 8" o.c. vertically.
- D. Mortar: Premixed Type N, Type S or mortar mixed using components and proportions following manufactured masonry manufacturer's installation instructions. Comply with ASTM C 270.
- E. Weep screed as required for installation over framed construction.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Examine substrates upon which manufactured masonry will be installed.
- C. Coordinate with responsible entity to correct unsatisfactory conditions.
- D. Commencement of work by installer is acceptance of substrate conditions.



### 3.2 PREPARATION

- A. Protection: Prevent work from occurring on the opposite of walls to which manufactured masonry is applied during and for 48 hours following installation of the manufactured masonry.
- B. Surface Preparation: Follow manufacturer's instructions for the appropriate type of manufactured masonry and substrate.

### 3.3 INSTALLATION

- A. Install Cultured Stone® products in accordance with manufacturer's Cast Stone installation instructions using grouted joints
- B. Install architectural trim products in accordance with manufacturer's installation instructions.
- C. Install/Apply related materials in accordance with type of substrate and manufactured masonry manufacturer's installation instructions.

### 3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean manufactured masonry in accordance with manufacturer's installation instructions.

### 3.5 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Protect finished work from rain during and for 48 hours following installation.
- C. Protect finished work from damage during remainder of construction period.

**END OF SECTION**

**SECTION 05 12 00**

**STRUCTURAL STEEL FRAMING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Structural shapes.
  - 2. Channels and angles.
  - 3. Hollow structural sections.
  - 4. Structural plates and bars.
  - 5. Bolts, connectors, and anchors.
  - 6. Grout.
- B. Related Requirements:
  - 1. Section 03 30 00 - Cast-In-Place concrete: Supply of anchors for casting into concrete.

**1.2 REFERENCE STANDARDS**

- A. American Institute of Steel Construction:
  - 1. AISC 303 - Code of Standard Practice for Steel Buildings and Bridges.
  - 2. AISC 341 - Seismic Provisions for Structural Steel Buildings.
  - 3. AISC 360 - Specification for Structural Steel Buildings.
- B. American Society of Civil Engineers:
  - 1. ASCE 19 - Standard Applications of Steel Cables for Buildings.
- C. ASTM International:
  - 1. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.
  - 2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 3. ASTM A153/153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 4. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - 5. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
  - 6. ASTM A490 - Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
  - 7. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
  - 8. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
  - 9. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.
  - 10. ASTM E164 - Standard Practice for Ultrasonic Contact Examination of Weldments.
  - 11. ASTM F436 - Standard Specification for Hardened Steel Washers.
  - 12. ASTM F959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
  - 13. ASTM F2329 - Standard Specification for Zinc Coating, Hot-Dip, Requirements for Application to Carbon and Alloy Steel Bolts, Screws, Washers, Nuts, and Special Threaded Fasteners.
- D. American Welding Society:

1. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.
2. AWS D1.1 - Structural Welding Code - Steel.

E. Research Council on Structural Connections:

1. RCSC - Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts.

F. SSPC: The Society for Protective Coatings:

1. SSPC - Steel Structures Painting Manual.
2. SSPC Paint 15 - Steel Joist Shop Paint.
3. SSPC Paint 20 - Zinc-Rich Primers (Type I - Inorganic and Type II - Organic).
4. SSPC SP 3 - Power Tool Cleaning.

### 1.3 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. Shop Drawings: Submit shop drawings prepared by a professional engineer registered in the state where the Work is located

1. Indicate profiles, sizes, spacing, and locations of structural members, openings, attachments, and bolts.
2. Connections. Connections not detailed.
3. Cambers and loads.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.

C. Manufacturer's Mill Certificate: Certify products meet or exceed specified requirements.

D. Mill Test Reports: Submit indicating structural strength, destructive and non-destructive test analysis.

E. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within previous 12 months.

### 1.4 QUALITY ASSURANCE

A. Perform Work in accordance with the following:

1. Structural Steel: AISC 303, AISC 341 and AISC 360.
2. Architecturally Exposed Structural Steel: AISC 303, Section 10.
3. High Strength Bolted Connections: RCSC Specification for Structural Joints Using ASTM A 325 or A 490 Bolts.
4. Steel Cable Structures: ASCE 19.

### 1.5 QUALIFICATIONS

A. Qualifications for Welding Work: Welders and Welding Procedures: AWS D1.1 qualified within previous 12 months.

## PART 2 PRODUCTS

### 2.1 STRUCTURAL STEEL

A. Structural W-Shapes: ASTM A992/A992M.

B. Channels and Angles: ASTM A36/A36M.

- C. Round and Rectangular Hollow Structural Sections: ASTM A500/A500M, Grade B.
- D. Structural Plates and Bars: ASTM A36/A36M.

## 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Bolts: Heavy hex, structural type.
  - 1. High Strength: ASTM A325; Type 1, plain or hot dipped galvanized where exposed to weather.
  - 2. Alloy Steel: ASTM A490.
- B. Nuts: ASTM A563 Grade; heavy hex type.
  - 1. Finish: Plain or hot dipped galvanized where exposed to weather.
- C. Washers: ASTM F436; Type 1, circular. Furnish clipped washers where space limitations require.
  - 1. Finish: Plain or hot dipped galvanized where exposed to weather.
- D. Anchor Rods: ASTM A307; Grade A.
  - 1. Shape: Hooked.
  - 2. Plate Washers: ASTM A36/A36M.
- E. Threaded Rods: ASTM A307; Grade A.
  - 1. Finish: Unfinished or hot dipped galvanized where exposed to weather.

## 2.3 WELDING MATERIALS

- A. Welding Materials: AWS D1.1; type required for materials being welded.

## 2.4 FABRICATION

- A. Continuously seal joined members by continuous welds. Grind exposed welds smooth.
- B. Fabricate connections for bolt, nut, and washer connectors.
- C. Develop required camber for members.

## 2.5 FINISHES

- A. Prepare structural component surfaces in accordance with SSPC SP 3.
- B. Shop prime structural steel members. Do not prime surfaces that will be fireproofed, field welded,
- C. Galvanizing: ASTM A123/A123M; hot dip galvanize after fabrication.
- D. Galvanizing for Bolts, Connectors, and Anchors:
  - 1. Hot-Dipped Galvanizing:
    - a. Bolts, Nuts, and Washers: ASTM F2329.
    - b. Connectors and Anchors: ASTM A153/A153M.

## 2.6 ACCESSORIES

- A. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing minimum compressive strength of 7,000 psi at 28 days.



- B. Shop Primer: SSPC Paint 15, Type 1, red oxide.
- C. Touch-Up Primer: Match shop primer.
- D. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20 Type I Inorganic

## 2.7 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Shop test bolted and welded connections as specified for field quality control tests.
- C. When fabricator is approved by authority having jurisdiction, submit certificate of compliance indicating Work performed at fabricator's facility conforms to Contract Documents.
  - 1. Specified shop tests are not required for Work performed by approved fabricator.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify bearing surfaces are at correct elevation.
- C. Verify anchors rods are set in correct locations and arrangements with correct exposure for steel attachment.

### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Furnish templates for installation of anchor rods and embedments in concrete and masonry work.

### 3.3 ERECTION

- A. Allow for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- B. Field weld components indicated on shop drawings.
- C. Field connect members with threaded fasteners; torque to required resistance.
- D. Do not field cut or alter structural members without approval of Architect/Engineer.
- E. After erection, touch up welds and abrasions to match shop finishes.

### 3.4 GROUT INSTALLATION

- A. Shim bearing plates and equipment supports to proper elevation, snug tighten anchor bolts.
- B. Fill void under bearing surface with grout. Install and pack grout to remove air pockets.

- C. Moist cure grout.
- D. Remove forms after grout is set. Trim grout edges to form smooth surface, splayed 45 degrees.
- E. Tighten anchor bolts after grout has cured for a minimum of 3 days.

### 3.5 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum variation for individual pieces from plumb, level, and alignment shall not exceed 1/500 of the axial length of the piece (non-cumulative).
- C. Overall Length:
  - 1. Members with both ends milled for contact bearing: +/- 1/32 inch.
  - 2. Members without ends milled for contact bearing which are framed to other members:
    - a. Members 30 feet or less in length: +/- 1/16 inch.
    - b. Members over 30 feet in length: +/- 1/8 inch.
- D. Straightness: Structural members may vary from straightness within the tolerances allowed for wide flange shapes by ASTM Specification A6, except that the tolerance on deviation from straightness of compression members is 1/1,000 of the axial length between points which are to be laterally supported.

### 3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.
- B. Bolted Connections: Inspect in accordance with AISC 303.
  - 1. Visually inspect all bolted connections.
  - 2. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.
- C. Welding: Inspect welds in accordance with AWS D1.1.
  - 1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
  - 2. Visually inspect all welds.
  - 3. Ultrasonic Inspection: ASTM E164; perform on all full penetration welds.
- D. Correct defective bolted connections and welds.

**END OF SECTION**

**SECTION 05 44 00**

**COLD-FORMED METAL TRUSSES**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes pre-engineered, pre-fabricated light gauge cold-formed steel framing elements.
  - 1. Light gauge cold-formed steel roof trusses.
  - 2. Anchorage, bracing and bridging.
- B. Related Sections:
  - 1. Section 06 10 00 – Rough Carpentry: Roof sheathing and miscellaneous wood framing.
  - 2. Section 09 21 16 – Gypsum Assemblies: Drywall attachment.

**1.2 REFERENCE STANDARDS**

- A. American Institute of Steel Construction:
  - 1. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members
  - 2. AISI S214 – Standard for Cold-Formed Steel Framing – Truss Design.
- B. ASTM International:
  - 1. ASTM A653/A653M-94 - Sheet Steel, Zinc-Coated (galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
  - 2. ASTM A780-93a - Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- C. American Welding Society:
  - 1. AWS D1.1 - Structural Welding Code - Steel.
  - 2. AWS D1.3 - Structural Welding Code - Sheet Steel.
- D. Structural Building Components Association:
  - 1. Cold-Formed Steel Building Component Safety Information (CFSBCSI).

**1.3 DESIGN REQUIREMENTS**

- A. Calculate structural characteristics of cold-formed steel truss members according to American Iron and Steel Institute North American Specification for the Design of Cold-Formed Steel Structural Members, 2012 – AISI S100-2012.
- B. Structural Performance: Design, fabricate, and erect cold-formed steel trusses to withstand specified design loads within limits and under conditions required.
  - 1. Design Loads: As specified.
  - 2. Deflections: Live load deflection meeting the following (unless otherwise specified):
    - a. Roof Trusses: Vertical deflection less than or equal to Length/240.
  - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 120 deg F.

#### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings:
  - 1. Submit detailed floor truss and roof truss layouts indicating placement of trusses.
  - 2. Submit individual truss drawings, sealed and signed by a qualified registered Professional Engineer, verifying accordance with local building code and design requirements, including:
    - a. Description of design criteria.
    - b. Engineering analysis depicting member stresses and truss deflection.
    - c. Truss member sizes and thickness and connections at truss joints.
    - d. Truss support reactions.
    - e. Top chord, Bottom chord and Web bracing requirements.
  - 3. Submit "The Works" (by Aegis Metal Framing) final roof and floor plan drawings sealed and signed by a qualified registered Professional Engineer depicting final installed truss assembly, including:
    - a. All truss to truss connections.
    - b. All truss to structure (bearing) connections.
    - c. Plan and details for the location of all permanent lateral and diagonal bracing and/or blocking required in the top chord, web, and bottom chord planes. (Diaphragms excluded).
- C. Product Data: Submit manufacturer's product data and installation instructions for each type of cold-formed steel framing and accessory required.

#### 1.5 QUALITY ASSURANCE

- A. Welding Standards: Comply with applicable provisions of AWS D1.1 - Structural Welding Code - Steel and AWS D1.3 Structural Welding Code - Sheet Steel.
  - 1. Qualify welding processes and welding operators in accordance with AWS Standard Qualification Procedure.

#### 1.6 QUALIFICATIONS

- A. Fabricator Qualifications: Fabrication shall be performed in a quality controlled manufacturing environment by a cold-formed steel truss fabricator with experience fabricating Cold-Formed Steel trusses equal in material, design, and scope to the trusses required for this Project.
- B. Installation of Cold Formed steel truss roof or floor assembly shall be performed by an installer with experience installing Cold-Formed Steel trusses equal in material, design and scope to the trusses required for this Project.
- C. Design cold-formed metal trusses under direct supervision of Professional Engineer experienced in design of this Work and licensed in the State of Michigan.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Deliver materials in manufacturer's unopened containers or bundles, fully identified by name, brand, type and grade. Exercise care to avoid damage during unloading, storing and erection.



- C. Store trusses on blocking, pallets, platforms or other supports off the ground and in an upright position sufficiently braced to avoid damage from excessive bending.
- D. Protect trusses and accessories from corrosion, deformation, damage and deterioration when stored at job site. Keep trusses free of dirt and other foreign matter.

#### 1.8 PROJECT CONDITIONS

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. During construction, adequately distribute all loads applied to trusses so as not to exceed the carrying capacity of any one truss.

#### 1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- 1. Manufacturer: Ultra-Span® Truss Manufacturer. Contact Aegis Metal Framing, LLC at 1-888-902-3447, or [www.Ultraspan.com](http://www.Ultraspan.com) for a list of authorized fabricators.
- 2. Substitutions: Not Permitted.

#### 2.2 COMPONENTS

- A. System components: Aegis Metal Framing ULTRA-SPAN® and POSI-STRUT® cold-formed steel roof truss and floor truss components.
- B. Provide manufacturer's standard steel truss members, bracing, bridging, blocking, reinforcements, fasteners and accessories with each type of steel framing required, as recommended by the manufacturer for the applications indicated and as needed to provide a complete cold-formed steel truss roof or floor assembly.

#### 2.3 MATERIALS

- A. Materials:
  - 1. For all chord and web members: Fabricate components of structural quality steel sheet per ASTM A653 with a minimum yield strength of 50,000 psi.
  - 2. Bracing, bridging and blocking members: Fabricate components of commercial quality steel sheet per ASTM A653 with a minimum yield strength of 33,000 psi.
- B. Ultra-Span steel truss components: Provide sizes, shapes and material thickness indicated by truss design.
  - 1. Design Uncoated-Steel Thickness: 0.0350 inch.
  - 2. Design Uncoated-Steel Thickness: 0.0460 inch.
  - 3. Design Uncoated-Steel Thickness: 0.0570 inch.
  - 4. Design Uncoated-Steel Thickness: 0.0730 inch.
  - 5. Design Uncoated-Steel Thickness: 0.0970 inch.
- C. Finish: Provide components with protective zinc coating complying with ASTM A653, minimum G60 coating.

- D. Fastenings:
  - 1. Manufacturer recommended self-drilling screws with corrosion-resistant plated finish. Fasteners shall be of sufficient size and number to ensure the strength of the connection.
  - 2. Welding: Comply with AWS D1.1 when applicable and AWS D1.3 for welding base metals less than 1/8" thick.
  - 3. Other fasteners as accepted by truss engineer.

## 2.4 FABRICATION

- A. Factory fabricate cold-formed steel trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations and the requirements of this Section.
  - 1. Fabricate truss assemblies in jig templates.
  - 2. Cut truss members by sawing or shearing or plasma cutting.
  - 3. Fasten cold-formed steel truss members by screw fastening, or other methods as standard with fabricator.
    - a. Locate mechanical fasteners and install according to cold-formed steel truss component manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- B. Care shall be taken during handling, delivery and erection. Brace, block, or reinforce truss as necessary to minimize member and connection stresses. Refer to SBCA - CFSBCSI.

## 2.5 FABRICATION TOLERANCES

- A. Overall Length: Fabricate each cold-formed steel truss to the maximum allowable tolerance as follows:
  - 1. Truss length up to 30 ft: 1/2 inch.
  - 2. Truss length over 30 ft: 3/4 inch.
- B. Overall Height: Fabricate each cold-formed steel truss to the maximum allowable tolerance as follows:
  - 1. Truss height up to 5 ft: 1/4 inch.
  - 2. Truss height over 5 ft : 1/2 inch.
- C. Squareness: Fabricate each cold-formed steel truss to a maximum out-of-square tolerance of 1/8 inch.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Examine structure, substrates and installation conditions. Do not proceed with cold-formed steel truss installation until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

### 3.2 INSTALLATION - GENERAL

- A. Erection of trusses, including proper handling, safety precautions, installation bracing and other safeguards or procedures is the responsibility of the Contractor and Contractor's installer. Refer to SBCA - CFSBCSI.
- B. Exercise care and provide installation bracing required to prevent toppling of trusses during erection. Provide Ultra-Span Stabilizer from Aegis Metal Framing for lateral bracing.
- C. Erect trusses with plane of truss webs vertical and parallel to each other, accurately located at design spacing indicated.
- D. Provide proper lifting equipment, including spreader bar, suited to sizes and types of trusses required, applied at lift points recommended by truss fabricator. Exercise care to avoid damage to truss members during erection and to keep horizontal bending of the trusses to a minimum.
- E. Provide framing anchors as indicated or accepted on the engineering design drawing or erection drawings. Anchor trusses securely at bearing points.
- F. Install trusses plumb, square, true to line, and with connections securely fastened, according to manufacturer's recommendations.
  - 1. DO NOT cut truss members without prior approval of truss engineer and Architect of Record.
  - 2. Fasten cold-formed steel trusses by screw fastening, welding or other methods, as standard with fabricator.
    - a. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to cold-formed truss manufacturer's instructions with screw penetrating joined members by not less than three exposed screw threads.
  - 3. Install trusses in one-piece lengths, unless splice connections are indicated.
  - 4. Provide installation bracing and leave in place until trusses are permanently stabilized.

### 3.3 INSTALLATION – ROOF TRUSSES

- A. Install trusses in accordance with manufacturer's installation instructions.
- B. Space trusses per approved sealed truss drawings.
- C. Do not alter, cut, or remove truss members or connections of truss members.
- D. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacing indicated.
- E. Erect trusses without damaging truss members or connections.
- F. Anchor trusses securely at all points of support, per approved submittals.
- G. Install all continuous bridging and permanent truss bracing per approved submittals.
- H. Perform all truss to truss connections per approved submittals.

- I. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists where indicated.
- J. Install miscellaneous truss framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable truss-framing assembly.

#### 3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Install trusses to a maximum allowable tolerance variation for level and true to line of 1/8 inch in 10 feet (1:960).
- C. Space individual trusses no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- D. Limit out-of-plane bow and plumb per SBCA – CFSBCSI.

#### 3.5 REPAIRS AND CORRECTIONS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanizing repair paint according to ASTM A780 and the manufacturer's instructions.

**END OF SECTION**



**SECTION 06 10 00**  
**ROUGH CARPENTRY**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes miscellaneous framing and sheathing; fire retardant treatment of wood; and concealed wood blocking for attachment and support.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Lumber Grades Authority:
  - 1. NLGA - Standard Grading Rules for Canadian Lumber.
- C. U.S. Department of Commerce National Institute of Standards and Technology:
  - 1. DOC PS 1 - Construction and Industrial Plywood.
  - 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
  - 3. DOC PS 20 - American Softwood Lumber Standard.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit technical data on wood preservative materials.
- C. Manufacturer's Certificate: Certify Products meet or exceed specified requirements.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with the following:
  - 1. Lumber Grading Agency: Certified by DOC PS 20.
  - 2. Wood Structural Panel Grading Agency: Certified by APA - The Engineered Wood Association.
  - 3. Lumber: DOC PS 20.
  - 4. Wood Structural Panels: DOC PS 1 or DOC PS 2.
- B. In lieu of grade stamping exposed to view lumber and wood structural panels, submit manufacturer's certificate certifying Products meet or exceed specified requirements.
- C. Surface Burning Characteristics:
  - 1. Fire Retardant Treated Materials: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- D. Apply label from agency approved by authority having jurisdiction to identify each fire retardant treated material.

## PART 2 PRODUCTS

### 2.1 LUMBER MATERIALS

- A. Lumber Grading Rules: NLGA.
- B. Non-structural Light Framing: SPF species, #2 grade or better, 19 percent maximum moisture content.
- C. Miscellaneous Framing and Blocking: SPF species, #2 grade or better, 19 percent maximum moisture content.

### 2.2 SHEATHING MATERIALS

- A. Wood Structural Panel Wall Sheathing: APA Rated Plywood; Exposure Durability 1; unsanded.

### 2.3 ACCESSORIES

- A. Fasteners and Anchors:
  - 1. Fasteners: Hot dipped galvanized steel for treated wood locations, unfinished steel elsewhere.
  - 2. Anchors: Epoxy screen tube and bolt for anchorage to hollow masonry. Expansion shield and lag bolt type for anchorage to solid masonry or concrete. Bolt for anchorages to steel.

### 2.4 FACTORY WOOD TREATMENT

- A. Fire Retardant Treatment: Chemically treated and pressure impregnated, having flame spread of 25 or less when tested in accordance with ASTM E 84 and showing no evidence of significant progressive combustion when test is continued for an additional 20 minute period, Interior Type. Equal to DriCon Fire Retardant Treated Wood.
- B. Moisture Content After Treatment: Redried.
  - 1. Lumber: Maximum 19 percent.
  - 2. Structural Panels: Maximum 15 percent.

## PART 3 EXECUTION

### 3.1 FRAMING

- A. Set structural members level and plumb, in correct position.
- B. Fasten framing in accordance with applicable code.
- C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in alignment until completion of erection and installation of permanent bracing.
- D. Place horizontal members, crown side up.
- E. Construct load bearing framing members full length without splices.

### 3.2 SHEATHING

- A. Fasten sheathing in accordance with applicable code.

- B. Secure roof sheathing with longer edge (strength axis) perpendicular to framing members and with ends staggered and sheet ends over bearing.
  - 1. Use sheathing clips between sheets between roof framing members.
- C. Secure wall sheathing with long dimension perpendicular to framing members, with ends over firm bearing and staggered.
- D. Secure wall sheathing to ICF surface with screws located 16 inches o.c. maximum horizontal and 12 inches o.c. vertical, with long dimension horizontal, and ends over nailing strips embedded in ICF forms. Screws shall be of sufficient length to penetrate through ICF nailing strip embedded 5/8" below ICF surface. Drive screws flush with plywood surface.

### 3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Framing Members: 1/4 inch from indicated position, maximum.

### 3.4 SCHEDULES

- A. Miscellaneous framing and blocking in exterior walls: S/P/F species, fire retardant treated (FRT).
- B. Miscellaneous blocking and nailers in roof: S/P/F species, fire retardant treated (FRT).
- C. Exterior Wall Sheathing: Plywood, 1/2 inch thick, 48 x 96 inch sized sheets, square edge, fire retardant treated (FRT).
- D. Exterior Roof Sheathing: Plywood, 5/8 inch thick, 48 x 96 inch sized sheets, square edge, fire retardant treated (FRT).
- E. Miscellaneous interior Blocking for support and anchoring: S/P/F species.

**END OF SECTION**

**SECTION 06 20 00**

**FINISH CARPENTRY**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Interior Finish Carpentry:
    - a. Standing and running trim.
- B. Related Requirements:
  - 1. Section 09 90 00 - Painting and Coating: Painting and finishing of finish carpentry items.

**1.2 REFERENCE STANDARDS**

- A. ASTM International:
  - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 2. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- B. Architectural Woodwork Institute:
  - 1. AWI AWS - Architectural Woodwork Standards.

**1.3 QUALITY ASSURANCE**

- A. Perform work in accordance with AWI AWS Section 6 Custom Grade.

**1.4 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Fabricator: Company specializing in fabricating products specified in this section with minimum three years documented experience.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect work from moisture damage.
- C. Maintain storage space relative humidity within ranges indicated in AWI AWS Section 2.

**1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.
  - 1. Maintain relative humidity within ranges indicated in AWI AWS Section 2.



## 1.7 EXISTING CONDITIONS

- A. Verify field measurements prior to fabrication. Indicate field measurements on shop drawings.

## PART 2 PRODUCTS

### 2.1 INTERIOR FINISH CARPENTRY

- A. Interior Standing and Running Trim: Softwood lumber, Idaho white pine, Grade II.
  - 1. Profile: Sizes and profiles to match existing.
  - 2. Cut: Plain sawn.
  - 3. Finger Jointing: Not permitted.
  - 4. Transparent Finished Trim: AWI AWS Section 6; Custom Grade.
- B. Lumber Moisture Content Range: 5-10 percent.

### 2.2 FINISHES

- A. Sand work smooth and set exposed nails and screws.
- B. Apply wood filler in exposed nail and screw indentations.
- C. On items to receive transparent finishes, use wood filler matching surrounding surfaces and of types recommended for applied finishes.
- D. Stain, seal, and varnish exposed to view surfaces.
- E. Seal internal surfaces and semi-concealed surfaces.
- F. Seal surfaces in contact with cementitious materials.

### 2.3 ACCESSORIES

- A. Fasteners and Anchors:
  - 1. Fasteners: ASTM A153/A153M, hot dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
  - 2. Nails: ASTM F1667.
- B. Wood Filler: Solvent base, tinted to match surface finish color.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify adequacy of backing and support framing.

### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Prime paint surfaces of wood items and assemblies to be in contact with cementitious materials.

### 3.3 INSTALLATION

- A. Install work in accordance with AWI AWS Section 6 and Custom Grade and manufacturer's instructions.
- B. Set and secure materials and components in place, plumb and level.
- C. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.
- D. Install components and trim with nails.
- E. Preparation For Site Finishing:
  - 1. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.
  - 2. Site Finishing: Refer to Section 09 90 00.

### 3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Indicated Position: 1/16 inch.
- C. Maximum Offset from Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**

**SECTION 07 21 16**

**BLANKET INSULATION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes batt insulation in framed exterior wall construction; and batt insulation for filling perimeter window and door shim spaces, and crevices in exterior wall.
- B. Related Sections:
  - 1. Section 07 26 00 – Vapor Retarder.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 3. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
  - 4. ASTM E970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source.

**1.3 SYSTEM DESCRIPTION**

- A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on product characteristics, performance criteria, limitations.

**1.5 QUALITY ASSURANCE**

- A. Insulation Installed in Concealed Locations Surface Burning Characteristics:
  - 1. Batt Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.
- B. Insulation Installed in Exposed Locations Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

**PART 2 PRODUCTS**

**2.1 BATT INSULATION**

- A. Manufacturers:
  - 1. Owens Corning Fiberglas
  - 2. Or equal.

## 2.2 COMPONENTS

- A. Batt Insulation: ASTM C665; preformed glass fiber batt or roll; friction fit, conforming to the following:
  - 1. Thermal Resistance: R of 3.75 per inch of thickness.
  - 2. Facing: Unfaced.
- B. Sheet Vapor Retarder: As specified in section 07 26 00.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate, adjacent materials, and insulation are dry and ready to receive insulation.

### 3.2 INSTALLATION

- A. Install in exterior wall cavities and spaces without gaps or voids. Do not compress insulation.
- B. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- C. Coordinate Work of this section with installation of vapor retarder specified in Section 07 26 00.

**END OF SECTION**



**SECTION 07 21 26**  
**BLOWN INSULATION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes: attic loose insulation pneumatically placed through access holes.
- B. Related Sections:
  - 1. Section 07 26 00 - Vapor Retarders: Vapor retarder materials adjacent to insulation.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM C764 - Standard Specification for Mineral Fiber Loose-Fill Thermal Insulation.
- B. Underwriters Laboratories of Canada:
  - 1. ULC S102.2 - Standard method of Test for Surface Burning Characteristics of Floor Coverings and Miscellaneous Materials and Assemblies.

**1.3 SYSTEM DESCRIPTION**

- A. Materials of This Section: Provide continuity of thermal barrier at building enclosure elements, in conjunction with Section 07 21 16 and with existing thermal barrier materials.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on product characteristics, performance criteria, and limitations.

**1.5 QUALITY ASSURANCE**

- A. Insulation Installed in Concealed Locations Surface Burning Characteristics:
  - 1. Loose Fill Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ULC S102.2.
- B. Insulation Installed in Exposed Locations Surface Burning Characteristics:
  - 1. Other Loose Fill Insulation: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ULC S102.2.
- C. Apply label from agency approved by authority having jurisdiction to identify each package of cellulose loose fill insulation.

**1.6 SEQUENCING**

- A. Do not install blown insulation until other trades are completed.
- B. Prior to substantial completion, repair any disturbed areas with additional insulation.

## PART 2 PRODUCTS

### 2.1 COMPONENTS

- A. Fiber Fill Insulation: ASTM C764, glass fiber type, bulk for pneumatic placement, total in-place R-value of 50.
- B. Ventilation Baffles: Formed plastic or other suitable material to maintain open airway for ventilation.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate, adjacent materials, and insulation are dry and ready to receive insulation.
- C. Verify spaces are unobstructed to allow placement of insulation.

### 3.2 INSTALLATION

- A. Install insulation baffles between trusses to maintain open airway for ventilation.
- B. Place insulation pneumatically, tight in trusses spaces achieve a minimum in-place R-value of 50.
- C. Place insulation against perimeter stops and/or baffles. Do not impede natural attic ventilation to soffit.
- D. Place against and behind mechanical and electrical services within plane of insulation.
- E. Completely fill intended spaces. Leave no gaps or voids.

### 3.3 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove loose insulation residue.

**END OF SECTION**

## **SECTION 07 26 00**

### **VAPOR RETARDERS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes sheet materials for controlling vapor diffusion.
- B. Related Sections:
  - 1. Section 07 21 16 – Blanket Insulation: Un-faced insulation requiring a vapor retarder.
  - 2. Section 07 21 26 – Blown Insulation: Loose insulation requiring a vapor retarder.

##### **1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
  - 2. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.
- B. Sealant, Waterproofing and Restoration Institute:
  - 1. SWRI - Sealant Specification.

##### **1.3 PERFORMANCE REQUIREMENTS**

- A. Vapor Retarder Permeance: Maximum 1 perm when tested in accordance with ASTM E96/E96M, desiccant method.

##### **1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data indicating material characteristics, performance criteria, and limitations.

##### **1.5 SEQUENCING**

- A. Section 01 10 00 - Summary: Work sequence.
- B. Do not install vapor retarder until items penetrating vapor retarder are in place.

#### **PART 2 PRODUCTS**

##### **2.1 VAPOR RETARDER**

- A. Sheet Retarder: Polyethylene film for above grade application, 6 mil thick.

##### **2.2 ACCESSORIES**

- A. Tape: Polyethylene self-adhering type, 2 inch wide, compatible with sheet material.

- B. Attachments: Staples and/or adhesives compatible with sheet material substrate.

### PART 3 EXECUTION

#### 3.1 PREPARATION

- A. Remove loose or foreign matter capable of impairing adhesion.
- B. Clean and prime substrate surfaces to receive adhesive.

#### 3.2 EXISTING WORK

- A. Clean and repair existing construction to provide positive and continuous seal for vapor retarders.

#### 3.3 INSTALLATION

- A. Vapor Retarder For Stud Framed Walls: Secure sheet retarder to stud faces with staples. Lap edges over stud faces, lap ends onto adjacent construction and seal with tape.
- B. Vapor Retarder For Truss Framed Roofs: Secure sheet retarder to truss faces with adhesive. Lap edges and ends and seal with tape.
- C. Vapor Retarder Seal For Openings: Install sheet retarder between window and door frames and adjacent vapor retarder and seal with tape. Position laps over firm bearing.
- D. Seal all laps and repair all tears or penetrations in vapor retarder with tape.

### END OF SECTION



**SECTION 07 31 13**

**ASPHALT SHINGLES**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Asphalt shingles.
  - 2. Membrane flashing.
  - 3. Underlayment
- B. Related Sections:
  - 1. Section 07 41 13 – Metal Roof Panels.
  - 2. Section 07 62 00 – Sheet Metal Flashing and Trim.

**1.2 REFERENCE STANDARDS**

- A. ASTM International:
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
  - 3. ASTM D2178 - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.
  - 4. ASTM D3018 - Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules.
  - 5. ASTM D3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
  - 6. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
  - 7. ASTM E108 - Standard Test Methods for Fire Tests of Roof Coverings.
  - 8. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- B. National Roofing Contractors Association:
  - 1. NRCA - The NRCA Steep Roofing Manual.
- C. Sheet Metal and Air Conditioning Contractors:
  - 1. SMACNA - Architectural Sheet Metal Manual.
- D. Underwriters Laboratories Inc.:
  - 1. UL 790 - Tests for Fire Resistance of Roof Covering Materials.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit samples of each shingle color indicating color range and finish texture/pattern; for color and texture selection.

**1.4 WARRANTY**

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.

- B. Furnish minimum twenty year manufacturer warranty for asphalt shingles.

## PART 2 PRODUCTS

### 2.1 ASPHALT SHINGLES

- A. Description: ASTM D3018, Class A, Type I - Self Sealing; and ASTM D3462; glass fiber mat base, mineral granule surface type; heavy weight; laminated overlay type; color and texture to match existing.
- B. Performance
  - 1. Roof Covering Fire Classification: Minimum Class A when tested in accordance with ASTM E108 or UL 790.

### 2.2 SHEET MATERIALS

- A. Underlayment: ASTM D1970; self-adhering polymer modified bituminous sheet material, 40 mils thick, 36 inches wide, with strippable release paper to expose adhesive surface; Ice and Water Shield as manufactured by Grace or equal.

### 2.3 ACCESSORIES

- A. Flashing and Drip Edge Materials:
  - 1. As specified in Section 07 62 00.
- B. Nails: ASTM F1667; standard round wire roofing nails hot dipped galvanized steel type, minimum 0.105 inch diameter shank, minimum 0.375 inch diameter head; of sufficient length to penetrate through roof sheathing.
- C. Plastic Cement: ASTM D4586, Asphalt type with mineral fiber components, free of toxic solvents, capable of setting within 24 hours at temperatures of 75 degrees F and 50 percent RH.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify deck surfaces are dry, free of ridges, warps, or voids.

### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Fill knot holes and surface cracks with latex filler at areas of bonded underlayment and/or membrane flashing.
- C. Broom clean deck surfaces under underlayment.

### 3.3 INSTALLATION

- A. Underlayment Installation:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Place one ply over substrate, with ends lapped. Stagger end laps of each consecutive layer. Weather lap each successive sheet over previous sheet working up slope.
  - 3. Weather lap and seal items projecting through or mounted on roof water tight with plastic cement.
- B. Metal Flashing and Accessories Installation:
  - 1. Install metal flashings over membrane flashing and underlayment.
  - 2. Apply plastic cement between metal flashing and roof underlayment.
  - 3. Weather lap joints minimum 2 inches and seal weather tight with plastic cement.
  - 4. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
  - 5. Secure in place with nails. Conceal fastenings.
  - 6. Seal metal joints watertight with plastic cement.
- C. Asphalt Shingles Installation:
  - 1. Place shingles in straight coursing pattern with recommended weather exposure to produce double thickness over full roof area. Install double course of shingles at eaves.
  - 2. Project first course of shingles extending beyond drip edge in accordance with manufacturer's instructions.
  - 3. Seal shingles to metal flashing with plastic cement.
  - 4. Complete installation to provide weather tight service.

**END OF SECTION**

**SECTION 07 41 13**  
**METAL ROOF PANELS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes standing seam, concealed fastener metal roof panels, with related metal trim and accessories.
- B. Related Sections:
  - 1. Section 06 10 00 – Rough Carpentry: Roof deck substrate.

**1.2 REFERENCES**

- A. American Society of Civil Engineers (ASCE):
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- B. ASTM International (ASTM):
  - 1. ASTM C920 - Specification for Elastomeric Joint Sealants.
  - 2. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
  - 3. ASTM E1514 - Standard Specification for Structural Standing Seam Steel Roof Panel Systems
- C. Sheet Metal and Air Conditioning Contractors:
  - 1. SMACNA - Architectural Sheet Metal Manual.
- D. Underwriters Laboratories, Inc. (UL):
  - 1. UL 580 - Tests for Uplift Resistance of Roof Assemblies.

**1.3 PERFORMANCE REQUIREMENTS**

- A. General: Provide metal roof panel assemblies that comply with performance requirements specified as determined by testing manufacturers' standard assemblies similar to those indicated for this Project, by a qualified testing and inspecting agency.
- B. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other.
- C. Structural Performance: Provide metal panel assemblies capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated:
  - 1. Wind-Uplift Resistance: Capable of producing sheet metal roofing assemblies that comply with UL 580 for Class 90 wind-uplift resistance.
  - 2. Snow Loads: As indicated.
  - 3. Deflection Limits: Withstand inward and outward wind-load design pressures in accordance with applicable building code with maximum deflection of 1/240 of the span with no evidence of failure.
  - 4. Seismic Performance: Comply with ASCE 7.



#### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Show layouts of metal panels. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, openings, penetrations, roof accessories, lightning arresting equipment, and special details. Make distinctions between factory and field assembled work.
  - 1. Indicate points of supporting structure that must coordinate with metal panel system installation.
  - 2. Include data indicating compliance with performance requirements.
  - 3. Include structural data indicating compliance with requirements of authorities having jurisdiction.
- C. Product Data: Submit Manufacturer's data sheet for specified Products.
- D. Samples for Initial Selection: For each exposed product specified including sealants. Provide representative color charts of manufacturer's full range of colors.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data: Submit Maintenance data.
- C. Manufacturer's Warranty: Submit executed copy of manufacturer's standard warranty.

#### 1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of metal roof panels through one source from a single manufacturer.
- B. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual and manufacturer's installation guidelines.
- C. Construction Inspection: Manufacturer shall conduct on site inspection and formal written report to architect and owner at the following intervals: 50 percent sheet metal roofing installation completion, and final inspection upon completion of roof system. Related to warranty - platinum plus level.

#### 1.7 QUALIFICATIONS

- A. Manufacturer/Source: Roll-Formed Sheet Metal Roofing Fabricator Qualifications: Minimum of 10 years factory forming experience.
- B. Installer Qualifications: Experienced Installer with minimum of 10 years experience with successfully completed projects of a similar nature and scope.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

- B. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.
- C. Protect materials from damage during transit and at project site. Store under cover, but sloped to provide positive drainage. Do not expose materials with strippable protective film to direct sunlight or extreme heat.
- D. Do not allow storage of other materials or allow staging of other work on installed metal panel system.
- E. Upon receipt of delivery of metal panel system, and prior to signing the delivery ticket, the installer is to examine each shipment for damage and for completion of the consignment.

## 1.9 FIELD MEASUREMENTS

- A. Field Measurements: Verify locations of roof framing and roof opening dimensions by field measurements before metal roof panel fabrication and indicate measurements on Shop Drawings.

## 1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate metal panel roof assemblies with flashing, trim, and construction of decks, walls, and other adjoining work to provide a leakproof, secure, and non-corrosive installation.

## 1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Special Installer's Warranty: Specified form in which Roofing Installer agrees to repair or replace components of custom-fabricated sheet metal roofing that fail in materials or workmanship within 5 years from date of Substantial Completion.
- C. Special Weathertight Warranty: Manufacturer's Platinum Plus warranty in which manufacturer agrees to repair or replace roof panel assemblies that fail to remain weathertight within the specified warranty period.
  - 1. Product Warranty Period: 20 years from date of Substantial Completion.
- D. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish Warranty Period: 30 years from date of Substantial Completion.

## PART 2 PRODUCTS

### 2.1 MANUFACTURER

- A. Basis of Design Manufacturer: ATAS International, Inc; Allentown, PA. Tel: (610)395-8445; Email: [info@atas.com](mailto:info@atas.com); Web: [www.atas.com](http://www.atas.com).
  - 1. Provide basis of design product, or comparable product approved by Architect prior to bid.

## 2.2 METAL ROOF PANELS

- A. General: Provide factory-formed metal roof panels designed to be field assembled by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation. Unless more stringent requirements are indicated, comply with ASTM E1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and flat pan between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together with approved seaming equipment.
  - 1. Basis-of-Design Product: ATAS International, Inc.; Field-Lok™; FLL135 or a comparable product matching existing.
  - 2. Material: Aluminum .032
    - a. Texture: Smooth
    - b. Pan Coverage: 13-1/2" or comparable to match existing.
    - c. Seam Height: 1"
    - d. KYNAR 5000® PDVF or HYLAR 5000® Finish, color to match existing.

## 2.3 UNDERLAYMENT

- A. Self-Adhering, High-Temperature Sheet: 45 mil homogeneous rubberized asphalt waterproofing compound, glass fiber reinforced designed specifically for use under sheet metal roofing. Basis for design ATAS ATA-Shield as supplied by ATAS International, Inc. Thermal Stability: Resistant to 240 deg F; ASTM D 970. Low Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.

## 2.4 MISCELLANEOUS MATERIALS

- A. Fasteners: Self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Manufacturer shall provide or authorize all fasteners utilized with the sheet metal roofing system.
  - 1. Exposed Fasteners: Heads matching color of sheet metal roofing by means of plastic caps or factory-applied coating.
  - 2. Fasteners for Flashing and Trim: Blind fasteners or screws spaced to resist wind uplift loads.
- B. Sealing Tape: Pressure-sensitive, 100 percent solid polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, non-sag, non-toxic, non-staining tape.
- C. Elastomeric Joint Sealant: ASTM C920, of base polymer, type, grade, class, and use classifications required to produce joints in sheet metal roofing that will remain weathertight.
- D. Expansion-Joint Sealant: For hooked-type expansion joints, which must be free to move, provide non-setting, non-hardening, non-migrating, heavy-bodied polyisobutylene sealant.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15 mil dry film thickness per coat.

## 2.5 ACCESSORIES

- A. Sheet Metal Roofing Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fascia, corner units, closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of sheet metal roofing, unless otherwise indicated. All trim and flashing components shall be supplied in a minimum of 12'-0" lengths and shall conform to manufacturer's standard part dimensions and details.
1. 26 ga. SS clip base w/26 ga. SS stem designed to withstand negative-load requirements.
  2. Closures: Closed-cell, expanded, cellular, rubber or cross linked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch thick, flexible closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
  3. Sealants as recommended by manufacturer.
  4. Fasteners as recommended by manufacturer.
- B. Flashing and Trim: Formed from matching materials as sheet metal roof panel in gauges noted. Provide flashing and trim in heavier gauge materials as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent sheet metal roofing.

## 2.6 FABRICATION

- A. General: Fabricate sheet metal roofing and components to comply with details shown, manufacturers installation details and recommendations in SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual that apply to the design, dimensions (pan width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the manufacturer's location to the greatest extent possible.
- B. General: Fabricate sheet metal roofing panels to comply with details shown and sheet metal roofing manufacturer's written instructions.
- C. Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks, true to line and levels indicated, and with exposed edges folded back to form hems.
1. Fold and cleat eaves as required by manufacturer to insure weathertightness and wind uplift resistance.
  2. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown and as required for leak proof construction and wind uplift resistance.
- D. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturers of dissimilar metals or by fabricator.



- E. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before manufacturer fabrication.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal roof panel supports, and other conditions affecting performance of work.
  - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
  - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
  - 3. For the record, prepare written report for the General Contractor, endorsed by Installer, listing conditions detrimental to performance of work.
- C. Examine roughing-in for components and systems penetrating metal roof panels to verify actual locations of penetrations relative to seam locations of metal roof panels before metal roof panel installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Fill knot holes and surface cracks with latex filler at areas of bonded underlayment and/or membrane flashing.
- B. Broom clean deck surfaces under underlayment.
- C. Lay out and examine substrate before installation of sheet metal roofing. Space fasteners as required to resist design uplift, but not more than 24 inches o.c.
- D. Install flashings and other sheet metal to comply with requirements specified in Section 07 62 00.

### 3.3 INSTALLATION - UNDERLAYMENT

- A. Install in accordance with manufacturer's instructions.

- B. Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply at locations noted on Drawings in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3.5 inches. Extend underlayment a minimum of 1.5 inches of fascia board. Roll laps with roller. Cover underlayment within 14 days.

### 3.4 INSTALLATION – METAL ROOFING

- A. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
  - 1. Field cutting of sheet metal roofing by torch is not permitted.
  - 2. Rigidly fasten ridge end of sheet metal roofing and allow for positive panel attachment as per manufacturer's recommendations. All flashing details shall accommodate thermal movement.
  - 3. Flash and seal sheet metal roofing at perimeter of all openings. Fasten with self-tapping screws.
  - 4. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition.
  - 5. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.
- B. Fasteners: Use fasteners of size and length as required for compatibility with substrate.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar metals.
  - 1. Separate sheet metal roofing from bituminous coating where roofing will contact wood, ferrous metal, or cementitious construction.
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- E. At eaves and gable edges, terminate roofing panels by hooking over edge strip.

### 3.5 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
- B. Install components required for a complete metal panel assembly, including trim, copings, flashings, sealants, closure strips, and similar items.

- C. Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual" and NRCA Waterproofing Manual. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

### 3.6 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Remove temporary protective coverings and strippable films, if any, as sheet metal roofing is installed. On completion of sheet metal roofing installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.

### 3.7 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect completed metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
- C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

**END OF SECTION**

## **SECTION 07 46 23**

### **WOOD SIDING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes sheathing paper, wood siding for walls, wood shakes for walls, related trim boards, corner boards, flashings, accessories, and fastenings.
  - 1. Type of Siding: Beveled board siding.
- B. Related Sections:
  - 1. Section 07 62 00 – Sheet Metal Flashing and Trim: Flashing materials.
  - 2. Section 07 90 00 - Joint Protection: Sealant at trim and dissimilar materials.
  - 3. Section 09 90 00 - Painting and Coating: Stain finish. Back prime siding.

##### **1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- B. Forest Stewardship Council:
  - 1. FSC Guidelines - Forest Stewardship Council Guidelines.
- C. Northeastern Lumber Manufacturers Association:
  - 1. NELMA - Standard Grading Rules for Northeastern Lumber.
- D. U. S Department of Commerce National Institute of Standards and Technology:
  - 1. DOC PS 1 - Construction and Industrial Plywood.
  - 2. DOC PS 2 - Performance Standard for Wood-Based Structural-Use Panels.
  - 3. DOC PS 20 - American Softwood Lumber Standard.
- E. West Coast Lumber Inspection Bureau:
  - 1. WCLIB - Standard Grading Rules for West Coast Lumber.
- F. Western Wood Products Association:
  - 1. WWPA G-5 - Western Lumber Grading Rules.

##### **1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data indicating materials, component profiles, fastening methods, jointing details, sizes, surface texture, and accessories.

##### **1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with the following:
  - 1. Lumber Grading Agency: Certified by DOC PS 20.
  - 2. Lumber: DOC PS 20.



## 1.5 VERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Store in ventilated areas with constant minimum temperature of 60 degrees F and maximum relative humidity of 55 percent.

## PART 2 PRODUCTS

### 2.1 WOOD SIDING

- A. Product Description: Furnish beveled board siding matching existing profile and size.
- B. Cedar Siding: Western Red Cedar, grade to match existing, to WCLIB Standard Grading Rules.

### 2.2 WOOD SHAKE SIDING

- A. Product Description: Furnish cedar shake siding matching existing profile and size.
- B. Cedar Shake Siding: Western Red Cedar, grade to match existing, to WCLIB Standard Grading Rules.

### 2.3 ACCESSORIES

- A. Nails: Corrosion resistant type; non-staining, of size and strength to securely and rigidly retain the work.
- B. Building Paper: ASTM D226; Type I, No. 15 unperforated asphalt felt.
- C. Flashing: As specified in Section 07 62 00.
- D. Accessory Components: Trim and corner boards of same material and finish as siding.

### 2.4 FABRICATION

- A. Bevel Siding:
  - 1. Bevel Size: 11/16 inch thick butt to match existing, 8 inch high nominal board to match existing.
  - 2. Surface Texture: Rough sawn.
- B. Cedar Shakes:
  - 1. Size: Butt, tip and height sized to match existing.
  - 2. Surface Texture: split and resawn to match existing.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

- B. Verify framing, substrate surfaces, and wall openings are ready to receive work.

### 3.2 PREPARATION

- A. Verify head and sill flashings are in place and sealed to substrate per Section 07 62 00.
- B. Pre-finish all siding, shake, and trim in accordance with Section 09 90 00.

### 3.3 INSTALLATION

- A. Building Paper: Install one layer of building paper horizontally on sheathed walls and ICF walls.
  - 1. Weather lap edges and ends minimum **6 inches**.
  - 2. Weather lap over vertical flashing elements.
  - 3. Stagger vertical joints.
  - 4. Nail in place.
- B. Trim Boards, Band Boards, and Corner Boards:
  - 1. Nail at maximum **12 inches** oc. Fasten boards in place level and plumb. Nail to aligned pattern.
  - 2. Miter horizontal joints tight at 45 degrees.
  - 3. Position cut ends over bearing surfaces. Sand cut edges smooth and clean.
  - 4. Apply sealant to non-weather lapped edges of siding to vertical trim as siding installation progress.
- C. Bevel Siding: Install bevel siding using single course method with **6 inch** exposure (match existing).
  - 1. Nail at maximum **12 inches** oc. Fasten siding in place level and plumb. Nail to aligned pattern.
  - 2. Miter horizontal joints tight at 45 degrees.
  - 3. Install siding for natural shed of water.
  - 4. Position cut ends over bearing surfaces. Sand cut edges smooth and clean.
  - 5. Apply sealant to non-weather lapped edges where siding abuts vertical trim as siding installation progress.
- D. Cedar Shake Siding: Install shake siding using single course method with **6 inch** exposure (match existing).
  - 1. Nail in place with two nails per shingle. Align along bottom edge in line with siding coursing. Fasten in place level and plumb. Nail to aligned pattern.
  - 2. Install shake siding for natural shed of water.
  - 3. Apply sealant to non-weather lapped edges where shake siding abuts vertical trim as shake siding installation progress.
- E. Preparation for Site Finishing:
  - 1. Set exposed fasteners, fill set holes, sand smooth.
  - 2. Site Finishing: Specified in Section 09 90 00.

### 3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Level: **1/4 inch per 10 feet**.
- C. Maximum Offset From Joint Alignment: **1/16 inch**.

**END OF SECTION**

**SECTION 07 62 00**

**SHEET METAL FLASHING AND TRIM**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes flashings and fabricated sheet metal items.
- B. Related Sections:
  - 1. Section 07 31 13 - Asphalt Shingles: Flashings and fabricated sheet metal items associated with shingle roofing.
  - 2. Section 07 46 23 – Wood Siding: Sheet metal flashings associated with wood siding.
  - 3. Section 07 90 00 - Joint Protection.

**1.2 REFERENCES**

- A. American Architectural Manufacturers Association:
  - 1. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
- B. ASTM International:
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
  - 3. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
  - 4. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.
  - 5. ASTM D4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
- C. Sheet Metal and Air Conditioning Contractors:
  - 1. SMACNA - Architectural Sheet Metal Manual.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on manufactured components metal types, finishes, and characteristics.
- C. Samples:
  - 1. Submit two samples illustrating metal finish color.

**1.4 QUALIFICATIONS**

- A. Fabricator and Installer: Company specializing in sheet metal work with minimum three years documented experience.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.



- B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- C. Prevent contact with materials causing discoloration or staining.

## 1.6 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate with Work of 07 31 13 and 07 46 33.

## PART 2 PRODUCTS

### 2.1 COMPONENTS

- A. Manufacturer's
  - 1. Alcoa Aluminum
  - 2. Substitutions: Or equal.
- B. Drip edge: Standard weight; 1/2 inch hem x 1-1/2 inch drop; fabricated from 0.019 inch pre-finished aluminum sheet, color to match existing.
- C. Soffit - perforated: Triple 4 inch Full Lanced U-groove Soffit; fabricated from 0.019 inch pre-finished aluminum sheet, color to match existing. Soffit shall provide a minimum net free area of 13.2 inches per square foot.
- D. Soffit - solid: Triple 4 inch Solid U-groove Soffit; fabricated from 0.019 inch pre-finished aluminum sheet, color to match existing.
- E. Fascia: 6, 8 inch ribbed; fabricated from 0.024 inch pre-finished aluminum sheet, color to match existing.
- F. J-channel: 1 inch face, offset, for use with specified soffit; fabricated from 0.019 inch pre-finished aluminum sheet, color to match soffit.

### 2.2 SHEET METAL FLASHING

- A. Pre-Finished Aluminum Sheet: ASTM B209; 3003 alloy, H14 temper; 0.032 inch thick; plain finish shop pre-coated with silicone polyester top coat; color to match existing.
- B. Copper: ASTM B370; H00 temper, 0.027 inch thick; natural finish.
- C. Membrane Flashing: ASTM D1970; self-adhering polymer modified bituminous sheet material, 40 mils thick, 18 inches wide, with strippable release paper to expose adhesive surface; Roof Detail Membrane as manufactured by Grace or equal.

### 2.3 ACCESSORIES

- A. Fasteners: Same material and finish as flashing metal.
- B. Underlayment: ASTM D226; Type I, No. 15 unperforated asphalt felt.
- C. Protective Backing Paint: Zinc molybdate alkyd.

- D. Sealant: Butyl sealant specified in Section 07 90 00.

## 2.4 FABRICATION

- A. Form sections shape indicated on Drawings, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

## 2.5 FACTORY FINISHING

- A. Silicone polyester coating: Baked enamel system conforming to AAMA 2603.
- B. Washcoat: Finish concealed side of metal sheets with washcoat compatible with finish system, as recommended by finish system manufacturer.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set,
- C. Verify roofing termination and base flashings are in place, sealed, and secure.

## 3.2 PREPARATION

- A. Paint concealed metal surfaces with protective backing paint to minimum dry film thickness of 15 mil.

## 3.3 INSTALLATION

- A. Secure flashings in place using concealed fasteners. Use exposed fasteners only where permitted.
- B. Weather lap membrane detail flashing over metal wall flashings.
- C. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- D. Seal metal joints watertight.

**END OF SECTION**

## **SECTION 07 84 00**

### **FIRESTOPPING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Firestopping through-penetrations of fire rated assemblies.
  - 2. Firestopping joints in fire rated assemblies.
  - 3. Firestopping tops of fire rated walls.
  - 4. Smoke sealing penetrations and joints of smoke partitions.
- B. Related Sections:
  - 1. Section 04 05 03 - Masonry Mortaring and Grouting: Mortar used for firestopping.
  - 2. Section 09 21 16 - Gypsum Board Assemblies: Gypsum board fireproofing.
  - 3. Section 23 31 00 – HVAC Ducts and Casings: HVAC work requiring firestopping.
  - 4. Section 23 33 00 – Air Duct Accessories: HVAC work requiring firestopping.
  - 5. Section 26 00 01 – General Electrical Requirements: Electrical work requiring firestopping.
  - 6. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables (600 V and less): Electrical work requiring firestopping.
  - 7. Section 26 05 34 – Conduit: Electrical work requiring firestopping.
  - 8. Section 28 31 00 – Fire Detection and Alarm: Electrical work requiring firestopping.

##### **1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
  - 4. ASTM E1966 - Standard Test Method for Fire-Resistive Joint Systems.
- B. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.
- C. Underwriters Laboratories Inc.:
  - 1. UL 263 - Fire Tests of Building Construction and Materials.
  - 2. UL 1479 - Fire Tests of Through-Penetration Firestops.
  - 3. UL 2079 - Tests for Fire Resistance of Building Joint Systems.
  - 4. UL - Fire Resistance Directory.

##### **1.3 DEFINITIONS**

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

##### **1.4 PERFORMANCE REQUIREMENTS**

- A. Conform to applicable code for fire resistance ratings and surface burning characteristics.

- B. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

#### 1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on product characteristics, performance and limitation criteria.
- C. Schedule: Submit schedule of opening locations and sizes, penetrating items, and required listed design numbers to seal openings to maintain fire resistance rating of adjacent assembly.
- D. Manufacturer's Installation Instructions: Submit preparation and installation instructions.
- E. Manufacturer's Certificate: Certify products meet or exceed applicable code requirements.
- F. Engineering Judgements: For conditions not covered by UL or WH listed designs, submit judgements by licensed professional engineer suitable for presentation to authority having jurisdiction for acceptance as meeting code fire protection requirements.

#### 1.6 QUALITY ASSURANCE

- A. Through Penetration Firestopping of Fire Rated Assemblies: UL 1479 or ASTM E814 with 0.10 inch water gage minimum positive pressure differential to achieve fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
  - 1. Wall Penetrations: Fire F-Ratings as indicated on Drawings, but not less than 1-hour.
  - 2. Floor and Roof Penetrations: Fire F-Ratings and temperature T-Ratings as indicated on Drawings, but not less than 1-hour.
    - a. Floor Penetrations Within Wall Cavities: T-Rating is not required.
- B. Through Penetration Firestopping of Non-Fire Rated Floor and Roof Assemblies: Materials to resist free passage of flame and products of combustion.
  - 1. Noncombustible Penetrating Items: Noncombustible materials for penetrating items connecting maximum of three stories.
  - 2. Penetrating Items: Materials approved by authorities having jurisdiction for penetrating items connecting maximum of two stories.
- C. Fire Resistant Joints in Fire Rated Floor, Roof, and Wall Assemblies: ASTM E1966 or UL 2079 to achieve fire resistant rating as indicated on Drawings for assembly in which joint is installed.
  - 1. Smoke Barrier Joints Air Leakage: Maximum 5 cfm per foot at 0.30 inches water gage pressure differential
- D. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.



## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not apply materials when temperature of substrate material and ambient air is below 60 degrees F.
- C. Maintain this minimum temperature before, during, and for minimum 3 days after installation of materials.
- D. Provide ventilation in areas to receive solvent cured materials.

## PART 2 PRODUCTS

### 2.1 FIRESTOPPING

- A. Manufacturers:
  - 1. A/D Fire Protection Systems, Inc.
  - 2. Hilti Corp.
  - 3. 3M Fire Protection Products
  - 4. Nelson Firestop Products
  - 5. Specified Technologies
  - 6. United States Gypsum Co.
  - 7. Substitutions: Or equal
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
  - 1. Silicone Firestopping Elastomeric Firestopping: Single component silicone elastomeric compound and compatible silicone sealant.
  - 2. Fiber Stuffing and Sealant Firestopping: Composite of mineral fiber stuffing insulation with silicone elastomer for smoke stopping.
  - 3. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
  - 4. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
  - 5. Firestop Pillows: Formed mineral fiber pillows.
  - 6. Mortar as specified in Section 04 05 03 where permitted by applicable code.

### 2.2 ACCESSORIES

- A. Primer: Type recommended by firestopping manufacturer for specific substrate surfaces and suitable for required fire ratings.
- B. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify openings are ready to receive firestopping.

### 3.2 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter affecting bond of firestopping material.
- B. Remove incompatible materials affecting bond.
- C. Install damming materials to arrest liquid material leakage.

### 3.3 APPLICATION

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating.
- D. Compress fibered material to maximum 40 percent of its uncompressed size.
- E. Remove dam material after firestopping material has cured.

### 3.4 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.
- B. Inspect installed firestopping for compliance with specifications and submitted schedule.

### 3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean adjacent surfaces of firestopping materials.

### 3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect adjacent surfaces from damage by material installation.

**END OF SECTION**

## **SECTION 07 90 00**

### **JOINT PROTECTION**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes sealants and joint backing and accessories.
- B. Related Sections:
  - 1. Section 07 84 00 - Firestopping: Firestopping sealants.
  - 2. Section 08 17 43 – FRP Flush Doors and Aluminum Framing System: Sealants in connection with entry framing.
  - 3. Section 08 80 00 - Glazing: Glazing sealants and accessories.

##### **1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM C834 - Standard Specification for Latex Sealants.
  - 2. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
  - 3. ASTM C1193 - Standard Guide for Use of Joint Sealants.

##### **1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Products Data: Submit data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.
- C. Samples: Submit two samples illustrating sealant colors for selection.

##### **1.4 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing Work of this section with minimum three years documented experience.

##### **1.5 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements.
- B. Maintain temperature and humidity recommended by sealant manufacturer during and after installation.

##### **1.6 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with sections referencing this section.

## PART 2 PRODUCTS

### 2.1 JOINT SEALERS

#### A. Manufacturers:

1. Dow Corning Corp.
2. Pecora Corp..
3. Sika Corp..
4. Tremco Sealants & Waterproofing.
5. Substitutions: Or equal.

#### B. Products Description:

1. Sealant S1 - High Performance General Purpose Exterior Sealant: Polyurethane; ASTM C920, Grade NS, Class 25, Uses M, G, and A; multi-component.
  - a. Acceptable Products:
    - 1) Dymeric 240FC manufactured by Tremco.
    - 2) Sikaflex-2c NS manufactured by Sika Corp.
    - 3) Dynatrol II by Pecora Corporation.
    - 4) Or equal.
  - b. Color: Standard colors matching finished surfaces.
2. Sealant S2 - High Performance Exterior Sealant: Polyurethane; ASTM C920 Type S, Grade NS, Class 35, Use T, NT, O, M, G, I; single-component; paintable.
  - a. Acceptable Products:
    - 1) SikaFlex - 1a by Sika Corp.
    - 2) Or equal.
  - b. Color: Standard colors matching finished surfaces.
3. Sealant S3 - Exterior Metal Lap Joint Sealant: Butyl, non-drying, non-skinning, non-curing.
  - a. Acceptable Products
    - 1) Butyl Sealant manufactured by Tremco.
    - 2) Pecora BA-98 manufactured by Pecora Corp.
    - 3) Or equal.
4. Sealant S4 - Interior Silicone Sealant: Silicone; ASTM C920, Grade NS, Class 25, Uses M and A; single component mildew resistant.
  - a. Acceptable Products:
    - 1) Tremsil 200 manufactured by Tremco
    - 2) Dow Corning 786 manufactured by Dow Corning Corp.
    - 3) Pecora 898 manufactured by Pecora Corp.
    - 4) Or equal.
  - b. Color: Clear.
5. Sealant S5 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C834, single component, paintable.
  - a. Acceptable Products:
    - 1) TremFlex 834 manufactured by Tremco.
    - 2) Pecora AC-20 + Silcone manufactured by Pecora Corp.
    - 3) Or equal.
  - b. Color: Standard colors matching finished surfaces.

### 2.2 ACCESSORIES

- #### A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- C. Joint Backing: Round foam rod compatible with sealant; ASTM D1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.
  - 1. Type: Everlastic manufactured by Williams Products, Inc. or equal.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify substrate surfaces and joint openings are ready to receive work.
- C. Verify joint backing and release tapes are compatible with sealant.

### 3.2 PREPARATION

- A. Remove loose materials and foreign matter impairing adhesion of sealant.
- B. Clean and prime joints.
- C. Perform preparation in accordance with ASTM C1193.
- D. Protect elements surrounding Work of this section from damage or disfiguration.

### 3.3 INSTALLATION

- A. Perform installation in accordance with ASTM C1193.
- B. Measure joint dimensions and size joint backers to achieve the following, unless otherwise indicated:
  - 1. Width/depth ratio of 2: 1.
  - 2. Neck dimension no greater than 1/3 of joint width.
  - 3. Surface bond area on each side not less than 75 percent of joint width.
- C. Install bond breaker where joint backing is not used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Tool joints concave.

### 3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean adjacent soiled surfaces.



3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Protect sealants until cured.

3.6 SCHEDULE

- A. Exterior joints for which no other sealant type is Indicated: Type S1.
- B. Exterior joints between wood siding, shakes and vertical trim: Type S2.
- C. Lap Joints in Exterior Sheet Metal Work: Type S3.
- D. Interior Joints for Which No Other Sealant is Indicated: Type S5.
- E. Joints between counter tops and walls: Type S4.

**END OF SECTION**

**SECTION 08 12 15**  
**CUSTOM STEEL FRAMES**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes fire rated and non-rated steel frames.
- B. Related Sections:
  - 1. Section 07 90 00 – Joint Protection: Joint sealers.
  - 2. Section 08 71 00 - Door Hardware: Hardware.
  - 3. Section 09 90 00 – Painting: Field painting of frames.

**1.2 REFERENCES**

- A. American National Standards Institute:
  - 1. ANSI A250.8 - Recommended Specifications for Standard Steel Doors and Frames.
- B. ASTM International:
  - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. National Fire Protection Association:
  - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
  - 2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.
  - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories Inc.:
  - 1. UL 10B - Fire Tests of Door Assemblies.
  - 2. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
  - 3. UL 1784 - Air Leakage Tests of Door Assemblies.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate frame elevations, reinforcement, anchor types and spacing, location of cut-outs for hardware, and finish.
- C. Product Data: Submit frame configuration and finishes.
- D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

**1.4 QUALITY ASSURANCE**

- A. Conform to requirements of ANSI A250.8.

- B. Fire Rated Frame Construction: Conform to one of the following:
  - 1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
  - 2. UL 10C.
- C. Installed Fire Rated Frame Assembly: Conform to NFPA 80 for fire rated class same as fire door.
- D. Attach label from agency approved by authority having jurisdiction to identify each fire rated door frame.

## 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Accept frames on site in manufacturer's packaging. Inspect for damage.
- C. Break seal on-site to permit ventilation.

## 1.7 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with frame opening construction, door, and hardware installation.
- C. Sequence installation to accommodate required door hardware electric wire connections.

# PART 2 PRODUCTS

## 2.1 STANDARD STEEL FRAMES

- A. Manufacturers:
  - 1. Amweld Building Products, Inc.
  - 2. Ceko Door Products
  - 3. Jambarton Corp.
  - 4. Kewanee Corp.
  - 5. Republic Builders Products
  - 6. Steelcraft
  - 7. Or equal
- B. Product Description: Standard shop fabricated steel frames, fire rated and non-rated types.
  - 1. Interior Frames:
    - a. 16 gage/0.053 inch thick material, base metal thickness.

## 2.2 ACCESSORIES

- A. Removable Stops: Rolled steel channel shape, butted corners; prepared for countersink style screws.

- B. Bituminous Coating: Non-asbestos fibered asphalt emulsion.
- C. Primer: ANSI A250.10 rust inhibitive type.
- D. Silencers: Resilient rubber fitted into drilled hole.
- E. Weatherstripping and/or smoke seals: Specified in Section 08 71 00.

## 2.3 FABRICATION

- A. Fabricate frames as welded unit.
- B. Fabricate frames with hardware reinforcement plates welded in place. Provide mortar guard boxes for frames set in masonry.
- C. Prepare frames for silencers. Provide three single silencers for single doors on strike side.
- D. Attach fire rated label to each fire rated frame.
- E. Fabricate frames to match frame elevations depicted in plans.
- F. Fabricate custom metal closures from same material as frame.

## 2.4 SHOP FINISHING

- A. Steel Sheet: Galvanized to ASTM A653/A653M G60.
- B. Primer: Baked.
- C. Coat inside of frame profile with bituminous coating to minimum thickness of 1/16 inch.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify opening sizes and tolerances are acceptable.

### 3.2 INSTALLATION

- A. Install frames in accordance with ANSI A250.8.
- B. Coordinate with wall construction for anchor placement.
- C. Coordinate installation of glass and glazing specified in Section 08 80 00.
- D. Coordinate installation of frames with installation of hardware specified in Section 08 71 00 and doors in Section 08 14 16.

3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

**END OF SECTION**



**SECTION 08 14 16**

**FLUSH WOOD DOORS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Flush wood doors.
  - 2. Door glazing.
- B. Related Requirements:
  - 1. Section 08 12 15 - Custom Steel Frames.
  - 2. Section 08 71 00 - Door Hardware.
  - 3. Section 08 80 00 - Glazing.

**1.2 REFERENCE STANDARDS**

- A. Architectural Woodwork Institute:
  - 1. AWI AWS - Architectural Woodwork Standards.
- B. Hardwood Plywood and Veneer Association:
  - 1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- C. National Fire Protection Association:
  - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
  - 2. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and other Opening Protectives.
  - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- D. Underwriters Laboratories Inc.:
  - 1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
  - 2. UL 1784 - Air Leakage Tests of Door Assemblies.
- E. Wood Window and Door Manufacturers Association:
  - 1. WDMA I.S 1A - Architectural Wood Flush Doors.

**1.3 COORDINATION**

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Coordinate Work with door opening construction, door frame and door hardware installation.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
  - 1. Submit data for door core materials and construction.
  - 2. Submit data for veneer species, type and characteristics.
  - 3. Submit data for factory finishes.

- C. Shop Drawings:
  - 1. Indicate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, and factory machining criteria.
  - 2. Indicate cutouts for glazing.
- D. Samples:
  - 1. Submit samples of door veneer, illustrating wood grain, stain color, and sheen.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with AWI AWS Section 9, Premium Grade.
- B. Finish doors in accordance with AWI AWS Section 5 Premium Grade.
- C. Fire Rated Door [and Transom] Construction: Conform to one of the following:
  - 1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
  - 2. UL 10C.
  - 3. 20-Minute Fire Rated Corridor Doors: Fire tested without hose stream test.
- D. Installed Fire Rated Door Assembly: Conform to NFPA 80 for fire rated class as indicated on Drawings.
- E. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.

#### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package, deliver and store doors in accordance with AWI AWS Section 2.
- C. Accept doors on site in manufacturer's packaging. Inspect for damage.
  - 1. Break seal on site to permit ventilation.

#### 1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.
- C. Interior Doors:
  - 1. Factory Finished Doors: Furnish manufacturer's life of installation warranty.

## PART 2 PRODUCTS

### 2.1 FLUSH WOOD DOORS

- A. Manufacturer List:
  - 1. Algoma Hardwoods Inc.
  - 2. Eggers Industries.
  - 3. Graham Manufacturing Corp.
  - 4. Marshfield Door Systems
  - 5. Mohawk Flush Doors, Inc.
  - 6. Oshkosh Architectural Door Company
  - 7. Or equal
- B. Flush Interior Doors: Solid core.
  - 1. Thickness: 1-3/4 inches
  - 2. Core: PC and FD.
  - 3. Face Construction: Five ply.
  - 4. Performance Duty Level: Heavy duty.
- C. Performance / Design Criteria:
  - 1. Performance Duty Level: WDMA I.S. 1A.
  - 2. Fire Resistance: As indicated on Drawings.

### 2.2 MATERIALS

- A. Door Cores: AWI AWS Section 9.
  - 1. Solid Core, Non-Fire Rated:
    - a. Type: PC; particleboard.
  - 2. Solid Core, Fire Rated: Category A for positive pressure fire test.
    - a. Type FD; fire resistive composite.
- B. Interior Door Faces:
  - 1. Transparent Finished Faces: Wood veneer.
    - a. Species: Red oak.
    - b. Veneer Cut: Plain sliced.
    - c. Veneer Matching: Book matched.
    - d. Face Matching: Running. Pair match multiple door leaves in single opening.
- C. Facing Adhesive: Type I - waterproof.

### 2.3 FABRICATION

- A. Fabricate doors in accordance with AWI AWS Section 9 requirements.
- B. Furnish closer and lock blocks at lock edge and top of door for closer for hardware reinforcement.
- C. Vertical Exposed Edge of Stiles: Wood veneer matching door facing.
- D. Fit door edge trim to edge of stiles after applying veneer facing.
- E. Bond edge banding to cores.

- F. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware. Furnish solid blocking for through bolted hardware.
- G. Factory fit doors for frame opening dimensions identified on shop drawings.
- H. Provide edge clearances in accordance with AWI AWS Section 9.

## 2.4 FINISHES

- A. Transparent Finish System: Stained, color and sheen as selected.
  - 1. System 9; UV curable epoxy, polyester, urethane.
- B. Seal door top edge with color sealer to match door facing.

## 2.5 ACCESSORIES

- A. Door Glazing:
  - 1. Glass: As specified in Section 08 80 00.
  - 2. Glazing Stops: Wood, of same species as door facing.
  - 3. Glazing Stops: Wood with metal clips for rated doors.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

## 3.2 INSTALLATION

- A. Install doors in accordance with AWI AWS Section 9 and manufacturer's instructions.
- B. Field Fitting and Trimming:
  - 1. Trim non-rated door width by cutting equally on both jamb edges.
  - 2. Trim door height by cutting bottom edges to maximum of 3/4 inch.
    - a. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
  - 3. Machine cut doors for hardware installation.
- C. Coordinate installation of doors with installation of frames specified in Section 08 12 15 and hardware specified in Section 08 71 00.
- D. Coordinate installation of glass and glazing specified in Section 08 80 00.

### 3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taut string, corner to corner, over imaginary 36 x 84 inches surface area.
- C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over imaginary 36 x 84 inches surface area.
- D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over imaginary 36 x 84 inches surface area.

### 3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Adjust door for smooth and balanced door movement.
- C. Adjust door closer for full closure.

**END OF SECTION**



## **SECTION 08 17 43**

### **FRP DOORS AND ALUMINUM FRAMING SYSTEM**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes FRP flush doors and aluminum frames. Doors and frames shall be fitted with factory applied weatherstripping as specified herein.
- A. Related Sections:
  - 1. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
  - 2. Section 08 71 00 – Door Hardware.
  - 3. Section 08 80 00 – Glazing.

##### **1.2 REFERENCES**

- A. AAMA:
  - 1. AAMA 1503 – Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- B. ASTM International:
  - 1. ASTM D256 – Standard Test Method for Determining the Izod Pendulum Impact Resistance of Plastics.
  - 2. ASTM D570 – Standard Test Method for Water Absorption of Plastics.
  - 3. ASTM D2583 – Standard Test Method of Indention Hardness of Rigid Plastics by Means of Barcol Impressor.
  - 4. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- C. DHI - Door Hardware Institute: The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

##### **1.3 DESIGN REQUIREMENTS**

- A. Provide door assemblies that have been designed and fabricated to comply with requirements for system performance characteristics listed below, as demonstrated by testing manufacturer's corresponding standard systems according to test methods designated.

##### **1.4 PERFORMANCE REQUIREMENTS**

- A. Thermal Transmission (exterior doors): "U" value of not more than 0.09 (BTH/Hr. x sf x degrees F.) per AAMA 1503.01.SUBMITTALS
- B. Flame Spread / Smoke Developed: Provide FRP doors and panels with the following ratings in according with ASTM E 84:
  - 1. Flame Spread: Not greater than 170 (Class C).
  - 2. Smoke Developed: Not greater than 390 (Class C).
- C. Class A option for flame spread and smoke developed rating on interior faces of exterior panels and both faces of interior panel as shown. Flame spread no greater than 15, smoke developed no greater than 310 per ASTM E-84.

- D. Additional Criteria: Provide FRP doors and panels with the following performance:
  - 1. ASTM D 256 - nominal value of 20.0
  - 2. ASTM D 570 - nominal value of .20 to 40
  - 3. ASTM D 2583 - nominal value of 50
- E. Abrasion Resistance: Face sheet to have no greater than .029 average weight loss percentage after Taber Abrasion Test - 25 cycles at 500 gram weight with H-18 wheel.
- F. Stain Resistance: Face sheet to be unaffected after 24 hour exposure to SVS-1 white spray enamel. Must retain DE of .57 or less with MacBeth Colorimeter. Dark Brown (bronze) FRP to be used as a basis.
- G. Chemical Resistance: Face sheet to be unaffected after 4 hour exposure to acetic acid (10% solution), acetone, sodium hypochlorite (5.25% solution) and hydrochloric acid (10% solution). No discoloration or panel damage will be allowed.

#### 1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Shop Drawings: Indicate door and frame elevations, reinforcement, anchor types and spacings, location of cut-outs for hardware, and finish.
- C. Product Data: Submit manufacturer's product data, specifications and instructions for each type of door and frame required in accordance with the following:
  - 1. Include details of core, stile and rail construction, trim for lites and all other components.
  - 2. Include details of finish hardware mounting.
- D. Samples:
  - 1. Submit samples of FRP door facing for selection of color and texture.
  - 2. Submit samples of each aluminum alloy to be used on this project. Where normal finish color and texture variations are expected, include two or more samples to show the range of such variations.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.
- F. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

#### 1.6 QUALITY ASSURANCE

- A. Standards: Comply with the requirements and recommendations in applicable specification and standards by AAMA, except to the extent more stringent requirements are indicated.
- B. Instruction: Manufacturer or manufacturer's representative will be available for consultation to all parties engaged in the project including instruction to installation personnel.
- C. Field Measurement: Field verify all information prior to fabrication and furnishing of materials. Furnish and install materials omitted due to lack of verification at no additional cost to Owner.
- D. Regulation and Codes: comply with the current edition in force at the project location of all local, state and federal codes and regulations, including the Americans with Disabilities Act.

## 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Supplier/Installer shall be factory direct authorized distributors of the specified product. Installers shall be as approved by the manufacturer with minimum 3 years documented experience with projects of similar size and scope.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Accept frames on site in manufacturer's packaging. Inspect for damage.

## 1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

## 1.10 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Requirements for coordination.
- B. Coordinate the work with frame opening construction, door, and hardware installation.

# PART 2 PRODUCTS

## 2.1 FRP DOORS AND ALUMINUM FRAMING

- A. Manufacturers
  - 1. Commercial Door Systems
  - 2. Special-Lite, Inc.
  - 3. Kawneer
  - 4. Substitutions: Not Permitted.

## 2.2 MATERIALS

- A. Aluminum Members: Alloy and temper as recommended by manufacturer for strength, corrosion resistance and application of required finish and control of color; ASTM B 221 for extrusions, ASTM B 209 for sheet/plate with aluminum wall thickness of 0.125".
- B. Sealant: For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

## 2.3 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel or other non-corrosive metal fasteners, guaranteed by the manufacturer to be compatible with the doors, frames, stops, panels, hardware, anchors and other items being fastened. For exposed fasteners (if any) provide Phillips head screws with finish matching the item to be fastened.

- B. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 90 00.

## 2.4 FABRICATION

- A. Sizes and Profiles: The required sizes for door and frame units, and profile requirements are shown on the drawings.
- B. Sizes and Profiles: The required sizes for door and frame units, and profile requirements are shown on the drawings.
- C. Complete the cutting, fitting, forming, drilling and grinding of all metal work prior to assembly. Remove burrs from cut edges, and ease edges and corners to a radius of approximately 1/64".
- D. Maintain continuity of line and accurate relation of planes and angles. Secure attachments and support at mechanical joints, with hairline fit at contacting members.

## 2.5 FIBERGLASS REINFORCED POLYESTER FRP FLUSH DOORS

- A. Materials and Construction:
  - 1. Construct 1-3/4" thickness doors of 6063-T5 aluminum alloy stiles and rails minimum 2-5/16" depth. Construct with mitered corners and provide joinery of 3/8" diameter full width tie rods through extruded splines top and bottom as standard. 125" tubular shaped stiles and rails reinforced to accept hardware as specified. Provide hex type aircraft nuts for joinery without welds, glues or other methods for securing internal door extrusions. Furnish integral reglets to accept face sheet to permit a flush appearance. Rail caps or other face sheet capture methods are not acceptable.
  - 2. Extrude top and bottom railings for interlocking continuous rigidity weather bar. Lock face sheet material in place with extruded interlocking edges to be flush with aluminum stiles and rails.
  - 3. Door face sheets: .120" thickness fiberglass reinforced polyester with an abuse resistance engineered surface of the standard colors as selected by the Architect.
  - 4. Core of Door Assembly: Minimum 5 lbs/cu.ft. density poured in place polyurethane free of CFC. Minimum "R" value of 11. Ballistic rating is as indicated. Meeting stiles on pairs of doors and bottom weather bar with nylon brush weatherstripping.
  - 5. Manufacture doors with cutouts for vision lites, louvers or panels as scheduled. Factory furnish and install all glass, louvers and panels prior to shipment.
  - 6. Pre-machine doors in accordance with templates from the specified hardware manufacturers and approved hardware schedule. Factory install hardware.

## 2.6 ALUMINUM FRAMING SYSTEM

- A. Tubular Framing: Framing system from the door manufacturer of the size and type shown. .125" minimum wall thickness and type 6063-T5 aluminum alloy. .625" high applied door stops with screws and weatherstripping. Frame members are to be box type with four (4) enclosed sides. Open back farming will not be acceptable.
- B. Caulk joints before assembling frame members with sealants recommended by manufacturer. Secure joints with fasteners and provide a hairline butt joint appearance. Prefit doors to frame assembly at factory prior to shipment. Field fabrication of framing using "stick" material is not acceptable

- C. Applied stops for side, transom and borrowed lites and panels, with fasteners exposed on interior or unsecure portion only. Pre-machine and reinforce frame members for hardware in accordance with manufacturer's standards and the approved hardware schedule. Factory install hardware.

## 2.7 FINISHES

- A. Anodized Surfaces: AAMA 611, AA-M12C22A44 non-specular as fabricated mechanical finish, medium matte chemical finish, and Architectural Class I 0.7 mils medium bronze anodized coating.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.

### 3.2 INSTALLATION

- A. Comply with manufacturer's recommendations and specifications for the installation of the doors and frames. Factory install hardware, glass and louvers in doors. Factory assemble side lites and transoms to the greatest extent possible.
- B. Set units plumb, level and true to line, without warp or rack of doors or frames. Anchor securely in place. Separate aluminum and other metal surfaces with bituminous coatings.
- C. Set thresholds in a bed of mastic and backseal.
- D. Glaze doors as specified in Section 08 80 00.
- E. Install perimeter sealants in accordance with Section 07 90 00.
- F. Clean surface promptly after installation of doors and frames, exercising care to avoid damage to the protective coatings.
- G. Ensure that the doors and frames will be without damage or deterioration (other than normal weathering) at the time of acceptance.
- H. Provide owner with all adjustment tools and instruction sheets. Arrange an in service session to Owner at Owner's convenience

### 3.3 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edges, crossed corner to corner.

### 3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.



- B. Adjust door for smooth and balanced door movement.
- C. Adjust door closer for full closure.

**END OF SECTION**

**SECTION 08 33 23**  
**OVERHEAD COILING DOORS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes fire rated overhead coiling door, operating hardware, electric operation.
  - 1. Provide wiring from electric circuit disconnect to door operator to control station.
- B. Related Sections:
  - 1. Section 09 90 00 - Painting and Coating: Field paint finish.
  - 2. Section 26 05 19 – Low-Voltage Electrical Power Cables (600V and Less): Power to disconnect.
  - 3. Section 26 05 34 - Conduit: Conduit from electric circuit to door operator and from door operator to control station.
  - 4. Section 28 31 00 - Fire Detection and Alarm: Fire alarm.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
  - 2. ASTM A666 - Standard Specification for Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
  - 3. ASTM A924 - Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
  - 4. **ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.**
  - 5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.
- C. National Electrical Manufacturers Association:
  - 1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
  - 2. NEMA ICS 2 - Industrial Control and Systems: Controllers, Contactors, and Overload Relays, Rated Not More Than 2000 Volts AC or 750 Volts DC.
  - 3. NEMA MG 1 - Motors and Generators.
- D. National Fire Protection Association:
  - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.
  - 2. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives.
  - 3. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
- E. Underwriters Laboratories Inc.:
  - 1. UL - Building Materials Directory.
  - 2. UL 10B - Fire Tests of Door Assemblies.
  - 3. UL 325 - Door, Drapery, Gate, Louver, and Window Operators and Systems.

### 1.3 SYSTEM DESCRIPTION

- A. Electric Operation: Electric motor operated unit.
- B. Fire Rated Assemblies: Fire rated door complying with NFPA 80; fusible link and fire alarm system activated with automatically governed closing speed.
  - 1. Design release mechanism for easy resetting by facility maintenance personnel.

### 1.4 PERFORMANCE REQUIREMENTS

- A. Fire Rated Door Construction: Conform to one of the following:
  - 1. NFPA 252.
  - 2. UL 10B.
- B. Attach label from agency approved by authority having jurisdiction to identify each fire rated door.
- C. Provide UL labeled smoke protection. Comply with with UL label for "Leakage Rated Assembly" or "S" label.
  - 1. Comply with NFPA 105 air leakage requirements.
  - 2. Pass UL test procedure 1784.
- D. Products Requiring Electrical Connection: Listed and classified by UL or another testing firm acceptable to authority having jurisdiction.

### 1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Include detailed plans and elevations, details of framing members, anchoring methods, clearances, hardware, and accessories.
- C. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Details of construction and fabrication.

### 1.6 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit lubrication requirements and frequency, and periodic adjustments required.

### 1.7 QUALIFICATIONS

- A. Manufacturer Qualifications: Company specializing in performing Work of this section with a minimum of five years experience.
- B. Installer Qualifications: Installer Qualifications: Company approved by manufacturer, specializing in performing Work of this section with minimum three years experience, with IDEA Certified Installers and service technicians on staff.

### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 – Product Requirements: Product storage and handling requirements.

- B. Store products in manufacturer's unopened packaging until ready for installation.
- C. Protect materials from exposure to moisture. Do not deliver until after wet work is complete and dry.
- D. Store materials in a dry, warm, ventilated weathertight location.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 – Product Requirements.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

#### 1.10 COORDINATION

- A. Section 01 30 00 – Administrative Requirements: Coordination and Project Conditions.
- B. Coordinate Work with other operations and installation of adjacent materials to avoid damage to installed materials.

#### 1.11 WARRANTY

- A. Warranty: Manufacturer's limited door and operators System warranty of all parts and components of the system except counterbalance spring and finish for 3 years or 20,000 cycles, whichever comes first.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Overhead Door Corp., 2501 S. State Hwy. 121, Suite 200, Lewisville, TX 75067. ASD. Tel. Toll Free: (800) 275-3290. Phone: (469) 549-7100. Fax: (972) 906-1499. Web Site: [www.overheaddoor.com](http://www.overheaddoor.com). E-mail: [info@overheaddoor.com](mailto:info@overheaddoor.com).
- B. Substitutions: Not Permitted.

#### 2.2 OVERHEAD COILING FIRE SERVICE DOORS

- A. Overhead Coiling Fire service Doors: FireKing Model 631 Fire Doors.
  - 1. Label: Provide fire doors certified with the following listing.
  - 2. Rolling fire doors up to 152 sf and not exceeding 13 feet 6 inches in width or height shall receive the UL 4-Hour Class A Label when face mounted to masonry opening.
  - 3. Provide UL labeled smoke protection.
- B. Curtain: Interlocking roll-formed slats as specified following. Endlocks shall be attached to each end of alternate slats to prevent lateral movement.
  - 1. Flat profile type F-265 for doors thru 14 feet wide by 12 feet high, fabricated of 24 gauge galvanized steel.
- C. Finish: Stainless Steel slats shall be finished No. 4 satin finish.

- D. Bottom Bar: Two stainless steel angles 1-1/2 inch by 1-1/2 inch by 1/8 inch minimum.
- E. Guides: Roll-formed steel shapes attached to continuous steel wall angle for doors through 12 feet wide.
  - 1. Finish: PowderGuard Weathered finish with iron/black powder.
  - 2. Fastening Guides to Masonry Fire Walls: UL listed for fire and smoke in accordance with manufacturer's listing.
- F. Brackets: To support counterbalance, curtain and hood:
  - 1. Hot rolled steel with black powder coated finish.
- G. Counterbalance: Helical torsion spring type housed in a steel tube or pipe barrel, supporting the curtain with deflection limited to 0.03 inch per foot of span. Counterbalance is adjustable by means of an adjusting tension wheel.
- H. Hood: 24 gauge galvanized primed steel.
- I. Electric Motor Operation: Provide electric operator as listed in the door UL file, for size as recommended by manufacturer to move door in either direction.
  - 1. Floor Resettable Electric Motor Operation.
  - 2. Sensing Edge Protection:
    - a. Electric sensing edge.
  - 3. Operator Controls:
    - a. Key operation with NEMA 1 interior, flush mounted open, close, and stop controls.
- J. Automatic Closure Standard Fire Door: UL approved release mechanism equipped with a 165 degree fusible link.
  - 1. Doors will be equipped with floor resettable electric motor operation system, requiring only one sash chain to be routed to the operated side (sash chain not required to be routed to adjusting wheel side.)
    - a. Release mechanism includes planetary gear differential system.
    - b. Door will close by a thermally actuated link rated @165 degrees F, or by a listed releasing device, or by manually activating the release handle.
    - c. All counterbalance spring tension shall be maintained when the release mechanism is activated.
    - d. After closing by manual activation of the release handle, the door shall be able to be reset by one person from one side of the door (re-engaging the release handle). No tools are required to reset the release mechanism.
    - e. After closing by alarm activation with power on the electric motor, the door shall be able to be reset by resetting the alarm system without additional tools required.
  - 2. Fire Sentinel time-delay release mechanism provides an added measure of safety to control the doors' closure.
- K. Governor: If required by the size for chain hoist doors, provide a viscous governor to regulate the rate of descent of door in a quiet manner. Use an engagement type that is not engaged during normal door operation, but after cable release, will retard the speed during automatic door closure to under 24 inches per second and not less than 6 inches per second per NFPA 80.
- L. Locking:
  - 1. Cylinder lock for electric operation with interlock switch.
- M. Wall Mounting Condition:
  - 1. Face-of-wall mounting.



## 2.3 FIRE SENTINEL TIME-DELAY RELEASE

- A. Model FSCX24V Release Device: For motorized doors operating on a voltage of 24VDC with battery backup.
1. Release device shall be used in conjunction with an appropriate UL 325-rated commercial door operator, either a gearhead, jackshaft, or hoist operator equipped with auxiliary open and close limit switches, to create a door closing system.
  2. Capable of holding and releasing up to a 40 lb. load imposed by a fusible link/sash chain assembly attached to a release mechanism within the door construction.
  3. Provide with an internal battery backup system capable of providing up to 24 hours of battery power to support alarm logic, smoke detector, release capability and audible and visible signaling appliances. Device shall monitor battery charge and annunciate the need for battery replacement via an integral sounder; a green, enclosure-mounted LED that indicates the presence of the battery backup system.
    - a. Battery backup/power system shall contain a management system providing trickle charge capabilities.
    - b. During a power outage, and upon depletion of the battery, the device will initiate door closure by releasing the fusible link/sash chain assembly and initiating gravity closure of the door.
    - c. A DIP-switch selectable feature shall provide the capability of operating on battery power upon loss of line power or closing the door through the release of the fusible link assembly initiating gravity closure of the door
  4. Includes DIP-switch selectable delay settings of 10, 20, or 60 seconds upon alarm activation to allow for passageway clearance before initiating door closure.
  5. Capable of receiving an alarm input from compatible 2-wire normally open smoke detectors, 4-wire normally open smoke detectors, or normally open heat detectors, or input from a fire alarm control panel via a relay module providing a Form C dry contact output to the release device.
    - a. Capable of receiving input from a maximum of two smoke detectors.
    - b. Use with an End-of-Line (EOL) device to ensure the integrity of the wiring.
  6. Provide with optional audible and visual signaling appliances to operate during the alarm closing cycle. Device shall be capable of activating and powering a maximum of two audible/visible notification devices, e.g. strobes, horns or horn/strobes. Device shall recognize that the door is in the closed position via input received from a proximity switch, located underneath the door and activated when the door is in the closed position and resting upon the switch, to prevent accidental release of the fusible link/sash chain (or 1/16th cable) assembly; an amber, enclosure-mounted LED shall indicate activation of the proximity switch.
  7. Provide with relay and trouble outputs to provide notification to a fire alarm control panel when an alarm or trouble state exists.
  8. Circuit board shall have diagnostic LEDs to assist with field installation by indicating alarm or trouble conditions present within the smoke detector loops, as well as activation of the auxiliary close limit switch.
  9. Includes an enclosure-mounted test switch that simulates an alarm condition when depressed and held for a length of time equal to the DIP-switch selectable delay setting, either 10, 20, or 60 seconds. A remote key test switch is also provided to simulate an alarm condition during testing procedures.
  10. Hold open/release device shall recognize that the door is in the closed position and where motor driven, be capable of sensing that power is available to the motor. The device may be wired to close on alarm.
  11. Upon alarm, the device shall offer the DIP-switch selectable feature of motorized door closure through the operator or bypassing the operator and initiating gravity door closure by releasing the fusible link assembly and engaging the door's release mechanism.

12. Audible and visual signaling appliances shall be provided to annunciate closure due to alarm or power loss conditions.
13. Device shall provide three-time obstruction cycling of the door through the operator
  - a. An electric sensing edge (by others) attached to the bottom edge of the door, and connected to both the device and the operator.
  - b. Upon contact by the sensing edge with an obstruction, the closing door shall reverse and the device will instruct the operator to repeat the attempt at closure two additional cycles.
  - c. Failure to reach the closed position will activate the one of two selectable actions.
14. Release device shall reverse the direction of the door through the operator upon the sensing edge making contact with an obstruction and repeat the attempt to achieve closure for two additional cycles.
  - a. Mode of operation upon failure to close the door shall be one of two DIP-switch selectable options.
    - 1) Failure to reach the closed position upon completion of the closure cycle or within a factory set time limit will result in the door being lowered by the operator upon the object. The door will rest on the obstruction until the obstruction is removed, at which point the door will resume closure through the operator to a fully closed position.
    - 2) Failure to reach the closed position upon completion of the closure cycle or within a factory selected time limit will result in gravity closure of the door. The door will rest on the obstruction until the obstruction is removed, at which point door closure shall be achieved through gravity drop.
  - b. Device shall provide a DIP-switch selectable 4-minute or 2-minute safety timer setting that will initiate gravity door closure if the operator close limit is not completed with the selected time or one of the modes of operation upon encountering an obstruction is not completed.
  - c. Loss of power to the operator or release device an alarm condition will result in gravity closure of the door.
15. Upon successful test completion of door closure through the operator with no obstructions encountered, the release device shall offer the DIP-switch selectable feature of allowing automatic open after the test input is cleared.
16. Release device shall offer a dry contact relay that may be used to activate signaling appliances or other external signaling functions.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify opening sizes, tolerances and conditions are acceptable.
- C. Examine conditions of substrates, supports, and other conditions under which this work is to be performed.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install rolling counter fire doors in compliance with requirements of NFPA 80. Test fire-release system and reset components after testing.
- C. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- D. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- E. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- F. Coordinate installation of electrical service with Section 26 05 19. Complete wiring from disconnect to unit components.
- G. Install and test Fire Sentinel release device(s) in accordance with the manufacturer's instructions and in compliance with applicable regulations and codes of the local authority having jurisdiction.
- H. Coordinate installation of sealants and backing materials at frame perimeter as specified in Section 07 90 00.
- I. Install perimeter trim and closures.

### 3.4 ERECTION TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maintain dimensional tolerances and alignment with adjacent Work.
- C. Maximum Variation From Plumb: **1/16 inch**.
- D. Maximum Variation From Level: **1/16 inch**.
- E. Longitudinal or Diagonal Warp: Plus or minus **1/8 inch per 10 ft** straight edge.

### 3.5 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion.
- C. Release device(s) shall be tested and witnessed for proper operation with the door manufacturer recommendations
- D. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.6 FIELD QUALITY CONTROL

- A. Functional testing of fire door and window assemblies shall be performed by IDEA Certified personnel with knowledge and understanding of the operating components of the type of door being subject to testing.

3.7 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean curtain and components using non-abrasive materials and methods recommended by manufacturer.
- C. Remove labels and visible markings.
- D. Touch-up, repair or replace damaged products before Substantial Completion.

3.8 PROTECTION

- A. Protect installed products until completion of project.

**END OF SECTION**

## **SECTION 08 52 00**

### **WOOD WINDOWS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Plastic clad wood windows.
  - 2. Factory glazing.
  - 3. Operating hardware.
  - 4. Insect screens.
- B. Related Requirements:
  - 1. Section 06 10 00 - Rough Carpentry: Framed openings.
  - 2. Section 07 26 00 - Vapor Retarders: Perimeter vapor seal between window frame and adjacent construction.
  - 3. Section 07 90 00 - Joint Protection: Perimeter sealant and back-up materials.
  - 4. Section 09 90 00 - Painting and Coating: Site finishing wood surfaces.

##### **1.2 REFERENCE STANDARDS**

- A. American Architectural Manufacturers Association:
  - 1. AAMA 101 - Voluntary Performance Specification for Windows, Skylights and Glass Doors.
  - 2. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.
- B. American Society of Civil Engineers:
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International:
  - 1. ASTM D1785 - Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  - 2. ASTM D3656 - Standard Specification for Insect Screening and Louver Cloth Woven from Vinyl-Coated Glass Yarns.
  - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 4. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
  - 5. ASTM E330 - Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
  - 6. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference.
  - 7. ASTM F588 - Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.
  - 8. ASTM E1886 - Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
  - 9. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes.
- D. Glass Association of North America:



1. GANA - FGMA Sealant Manual.

E. National Fenestration Rating Council Incorporated:

1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.

1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit component dimensions, anchorage and fasteners, glass, internal drainage details and for window hardware and accessories.
- C. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work; and installation requirements.
- D. Samples:
  1. Submit cladding and hardware color samples for selection.

1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with the following:
  1. Plastic Clad Wood Windows: Fabricate and label window assemblies in accordance with AAMA 101 for types of windows required.
  2. Insulated Glass: Fabricate insulated glass units in accordance with GANA.
- B. Surface Burning Characteristics:
  1. Foam Insulation: Maximum 75/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing wood windows with minimum three years documented experience.
- B. Installer: Company specializing in performing installation of wood windows with minimum three years documented experience and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.7 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Do not install sealants when ambient temperature is less than 40 degrees F.
- C. Maintain this minimum temperature during and after installation of sealants.

## 1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for warranties.
- B. Furnish five year manufacturer's warranty for insulated glass units from seal failure, interpane dusting or misting, and replacement of same.
- C. Warranty:
  - 1. Include coverage for degradation of color finish.
  - 2. Include coverage for delamination or separation of finish cladding from window member.

## PART 2 PRODUCTS

### 2.1 WOOD WINDOWS

- A. Manufacturer and Product List:
  - 1. Andersen Commercial; 400 series as basis of design.
  - 2. No substitutions.
- B. Product Description: Commercial quality wood windows, site finished plastic clad finish, sash, glass and glazing, operating hardware, and insect screen for operable windows.
- C. Window Configuration: outward opening, side hinged sash.
- D. Performance / Design Criteria:
  - 1. Primary Performance Requirements: AAMA 101 Designation LC-PG50 or better.

### 2.2 COMPONENTS

- A. Wood: Clear Pine species, clear preservative treated, of type suitable for transparent interior finish.
- B. Plastic Cladding (Exterior Surface): Extruded PVC, low sheen surface, factory fit to profile of exterior exposed surfaces; ASTM D1785 PVC, minimum 35 mils thick, with integral surface applied ultra-violet degradation resistance; welded corners.
- C. Frames: Seamless one piece, preformed rigid vinyl frame covered secured to the exterior of the frame with nailing flange. Clear pine interior stops.
- D. Glazing: High-Performance Low E.
- E. Weather-stripping: Flexible bulb or black PVC closed cell foam.
- F. Screen: Perma-Clean insect screen.
- G. Hardware: Andersen Classic Collection with compact operator handle.
- H. Interior Trim: Window distributor shall provide jamb extension members at interior window frame perimeter to close off shim space between new window and wall construction. Installation of interior trim by others.

## 2.3 SEALANT MATERIALS

- A. Sealant and Backing Materials: As specified in Section 07900.

## 2.4 FINISH

- A. Rigid vinyl PVC cladding - color to match existing.
- B. Interior finish. Job site finish. Finish all exposed unfinished wood. Refer to Section 09 90 00.
- C. Exposed Hardware: Baked enamel color to match existing.

## 2.5 ACCESSORIES

- A. Anchors: Hot dip galvanized steel.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this section, and opening dimensions and clearances are as indicated on shop drawings.

## 3.2 INSTALLATION

- A. Install windows in accordance with manufacturer's recommendations and approved shop drawings to achieve weathertight and freely operating installation.
- B. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- C. Secure assembly to framed openings, plumb and square, without distortion.
- D. Place insulation in shim spaces around unit perimeter to maintain continuity of building thermal barrier.
- E. Install sealant and related backing materials at perimeter of assembly. Refer to Section 07900.
- F. Install sills, stools, and aprons.
- G. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- H. Coordinate attachment and seal of perimeter air and vapor retarder materials.
- I. Install operating hardware.

## 3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.

- B. Maximum Variation from Level and from Plumb: 1/16 inches every 3 ft non-cumulative or 1/8 inches per 10 ft, whichever is less.

#### 3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Adjust hardware for smooth operation and secure weathertight closure.

#### 3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Remove protective material from factory finished surfaces.
- C. Remove labels and visible markings.
- D. Wash surfaces by method recommended and acceptable to sealant and window manufacturer; rinse and wipe surfaces clean.

**END OF SECTION**

## **SECTION 08 71 00**

### **DOOR HARDWARE**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes:
  - 1. Furnish hardware required to complete the work as shown on the drawings and as specified herein;
  - 2. Furnish trim attachments and fastenings, specified or otherwise required, for proper and complete installation.
  - 3. Deliver to the job site those items of finish hardware scheduled to be installed at the job site;
    - a. Butt Hinges
    - b. Lock cylinders and keys
    - c. Lock and latch sets
    - d. Door trim
    - e. Seals
- B. Related Sections:
  - 1. Section 08 12 15 - Custom Steel Frames.
  - 2. Section 08 14 16 – Flush Wood Doors.
  - 3. Section 08 17 43 - FRP Flush Doors and Aluminum Framing System.

##### **1.2 DEFINITIONS**

- A. "Finish Hardware": Items required for swinging doors, except special types of unique and non-matching hardware specified under door and frame Sections of these Specifications.

##### **1.3 DESIGN REQUIREMENTS**

- A. Thoroughly review finish hardware schedule, comparing it with the floor plan, door schedule, and door details to verify hardware requirements, quantities, door swings, finishes, and sizes.
- B. If an inconsistency or error in the proposed construction documents is suspected, the hardware supplier is to bring it immediately to the attention of the Architect. If the quantity of items is questioned, for bidding purposes, assume the higher quantity is required and price accordingly.
- C. Architect's review of Submittals is for design concept only, and does not relieve the Contractor of the responsibility to furnish sufficient material and functions required for a complete, and code-worthy installation. Determination of all quantities is the responsibility of the Contractor.

##### **1.4 PERFORMANCE REQUIREMENTS**

- A. Furnish finish hardware complying with the requirements of laws, codes, ordinances and guidelines of governmental authorities having jurisdiction:
- B. NFPA 101, "Life Safety Code", 2000 edition.
- C. International Building Code - 2009 Edition
- D. ANSI A117.1-2003 Accessible and Usable Buildings and Facilities



## 1.5 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product data:
  - 1. Submit "Finish Hardware Schedule" in the following format:
    - a. Vertically-typed, double-spaced;
    - b. Organized into "hardware sets", indicating complete designations of every item required for each door or opening. Include the following information for each item of finish hardware:
      - 1) Manufacturer
      - 2) Type
      - 3) Style
      - 4) Function
      - 5) Size
      - 6) Degree and direction of opening swing ("hand")
      - 7) Finish
      - 8) Fasteners
      - 9) Location of hardware set cross-referenced to indications on floor plans, door, schedule, and frame schedule.
      - 10) Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
      - 11) Mounting heights and locations for hardware.
      - 12) Door and frame sizes and materials.
      - 13) Keying information.

## 1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with the following requirements:
  - 1. ANSI A156 series.
  - 2. NFPA 80.
  - 3. UL 305.

## 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Source limitations: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.
  - 1. Include instructions, templates, and fasteners needed for installation.

## 1.9 COORDINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.

- B. Coordinate Owner's keying requirements during course of Work.

## PART 2 PRODUCTS

### 2.1 GENERAL

- A. Requirements for design, grade, function, finish, size, and other distinctive qualities of each finish hardware item is indicated in the Drawings.
- B. Product designations:
  - 1. Provide the product designated or the comparable product by the Manufacturers listed under this Section.
- C. ANSI/BHMA designations:
  - 1. Used to describe hardware items, or to define quality or function. Provide products complying with these standards in addition to additional requirements of this Section.
- D. Hand of door: Drawings show direction of slide, swing ("hand") of door leaves.
- E. Hardware: Use hardware manufactured to conform to published templates and, generally, prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

### 2.2 MATERIALS

- A. Base metals:
  - 1. Manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially-recognized) quality than that specified for applicable hardware units by applicable ANSI A156 series standard for each type hardware item and with ANSI A156.18 for finish designations indicated.
  - 2. Do not furnish "optional" materials for those indicated, except as otherwise specified.
- B. Fasteners:
  - 1. Furnish Phillips flat-head screws with each hardware item, unless otherwise indicated.
  - 2. Exposed screws: Match finish of hardware (even where noted to be "prepared for paint").
  - 3. Use concealed fasteners for hardware units which are exposed when door is closed, except where no standard units of type specified are available with concealed fasteners.
  - 4. Do not use thru-bolts where bolt head or nut on opposite face would be exposed.
  - 5. Where adequate reinforcement is not feasible, thru-bolting would only be acceptable if through sleeves, or if sex-screw fasteners are used.
- C. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of finish hardware.

### 2.3 MANUFACTURED UNITS

- A. Hardware finishes:
  - 1. Materials and Finishes Standard: Comply with ANSI A156.18 (BHMA 1301). Finish designations used in schedules are listed, therein.
  - 2. Match the color and texture of hardware items to manufacturer's standard finish for the latchset, lockset, or push-pull unit.

3. Provide quality of finish, including thickness of plating or coating, composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than that specified or described by referenced standards.

## 2.4 PRODUCTS

- A. Hinges, butts and pivots:
  1. Acceptable products:
    - a. For interior Heavy weight hinges:
      - 1) Ives 5BB1HW
      - 2) Acceptable substitutions:
        - a) Equivalent by McKinney or Stanley.
    - b. For interior standard weight hinges:
      - 1) Ives 5BB1
      - 2) Acceptable substitutions:
        - a) Equivalent by McKinney or Stanley.
- B. Locksets:
  1. Schlage AL Series to match existing, No Substitute
  2. All Lockset Functions shall be verified with owner prior to ordering
  3. Site walk-through is mandatory prior to order to verify field conditions and to insure compatibility of replacement materials for existing conditions.
- C. Exit Devices:
  1. Von Duprin 98 series, No Substitute.
- D. Electronic Access Control Components/Exit Device Trim:
  1. Electronic Access control and exit trim to be Schlage AD series to match existing. Supplied by Owner/Access Control Contractor. Coordinate between Access Control and Hardware supplier.
- E. Lock Cylinders and Keying:
  1. General:
    - a. Match existing Schlage system.
- F. Closers:
  1. LCN 4000/4040 series to match existing, No Substitute
- G. Wall Stops:
  1. Ives as shown in HW Sets.
  2. Acceptable substitutions:
    - a. Equivalent by Rockwood or Trimco is acceptable
- H. Seals
  1. National Guard 188S.
  2. Acceptable substitutions:
    - a. Equivalent by Pemko or National Guard.

## 2.5 OTHER MATERIALS

- A. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Architect.

## 2.6 HARDWARE FINISHES

### A. General:

1. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible and except as otherwise indicated.
2. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening.
3. In general, match items to the manufacturer's standard finish for the latch and lock set (or push/pull units if no latch/lock sets) for color and texture.
4. Provide finishes matching those established by BHMA or, if none established, match the Architect's sample.
5. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than that specified for the applicable units of hardware by referenced standards.
6. Finish designations used in schedules and elsewhere listed in ANSI A156.18 "Materials and Finishes Standard", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

### B. Base material: Manufacturer's standard high-carbon steel, brass, or bronze.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.
- C. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

### 3.2 INSTALLATION

#### A. General:

1. Install each item in its proper location firmly anchored into position, level and plumb, and in accordance with the manufacturer's recommendations.
2. Hanging, hardware heights, locations, and degree of opening swing are indicated in the Drawings and Finish Hardware Schedule.
3. Mount finish hardware units:
  - a. At recommended heights and locations as shown in approved finish hardware schedule, complying with requirements of the A.D.A., and pertinent provisions of the Building Code.
  - b. To function at proper degree of opening of doors as indicated on approved finish hardware schedule.
  - c. By manufacturer's template.
  - d. Prior to final finishing of the door. Remove hardware to allow finishing of door, and permanently reinstall hardware upon completion of finishing operation.
4. Reinforce, where necessary, the substrate to assure proper attachment.
5. Drill and countersink units which are not factory-prepared for anchorage fasteners.
6. Space fasteners and anchors in accordance with industry standards.

- B. Installing closers:
  - 1. Mount closers per manufacturer's template, and secure the Architect's approval of the closer installation.
  - 2. The Contractor will be required to replace doors onto which closers are improperly mounted at no additional cost to the Owner. Repair or patching of such doors will not be acceptable.

### 3.3 ADJUSTING AND CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Testing, adjusting, and balancing.
- B. Check and adjust each item of hardware and each door upon completion of final installation. Verify proper function, and replace units which cannot be made to operate freely and smoothly, as intended for the application.
- C. Clean adjacent surfaces soiled by hardware installation.

### 3.4 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit adjacent work to damage hardware or hardware finish.

Hardware Group No. 01

For use on mark/door #(s):  
129.4

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	ENTRANCE LOCK	AL53PD SAT	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE

Operational Description

Turn/push-button locking; pushing and turning button locks outside lever requiring use of key until button is manually unlocked. Push-button locking; pushing button locks outside lever until unlocked by key or by turning inside lever.by key or by turning inside lever.  
Self-Closing.



Hardware Group No. 02

For use on mark/door #(s):  
129.6

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	AL70PD SAT	626	SCH
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	SET	SEALS	2525B	BRN	NGP

Operational Description

Outside lever locked and unlocked by key. Inside lever always unlocked.  
Self-Closing.

Hardware Group No. 03

For use on mark/door #(s):  
129.5

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
6	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
2	EA	PUSH PLATE	8200 4" X 16"	630	IVE
2	EA	PULL PLATE	8302 10" 4" X 16"	630	IVE
2	EA	SURFACE CLOSER	4040XP	689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS	630	IVE
2	EA	WALL STOP	WS406/407CCV	630	IVE

Operational Description

Self-Closing.

Hardware Group No. 04

For use on mark/door #(s):  
129.3

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	AL70PD SAT	626	SCH
1	EA	WALL STOP	WS406/407CCV	630	IVE

Operational Description

Outside lever locked and unlocked by key. Inside lever always unlocked.

Hardware Group No. 05

For use on mark/door #(s):

129.7                      130.1

Each To Have:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	9847-L-DT-06	626	VON
1	EA	PANIC HARDWARE	9847-NL-OP-110MD	626	VON
1	EA	ELEC EXIT DEVICE	AD-400-993R-70-MT-RHO-PD-LRX	626	SCE
		TRIM	- by Owner/Access Control Contractor		
2	EA	OH STOP	100S	630	GLY
2	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	THRESHOLD	425HD	AL	NGP
1	EA	PIM	PIM AS REQUIRED		SCE
			- by Owner/Access Control Contractor		
1	EA		WEATHERSTRIP BY DOOR/FRAME		
			MANUFACTURER		

Perform wireless testing and verify operation prior to permanently mounting PIM(s) to ensure connectivity.

Operational Description

Free Egress at all times. Pressing Push Bar retracts latchbolts. Lever always rigid, entrance by lever when latchbolt is in retracted position. Dogging by hex key, locks down the pushbar or crossbar so the latchbolt remains retracted.

Free Egress at all times. Pressing Push Bar retracts latchbolts. Trim always locked, entrance by electronic trim when valid credential is presented. Dogging by hex key, locks down the pushbar or crossbar so the latchbolt remains retracted..

Self-Closing.

**END OF SECTION**

## **SECTION 08 80 00**

### **GLAZING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Glass glazing for metal frames, and doors.
  - 2. Glass glazing materials and installation requirements are included in this section for other sections referencing this section.
- B. Related Sections:
  - 1. Section 07 90 00 - Joint Protection: Sealant and back-up material other than glazing sealants.
  - 2. Section 08 12 15 – Custom Steel Frames: Glazed frames.
  - 3. Section 08 14 16 - Flush Wood Doors: Glazed doors.
  - 4. Section 08 17 43 - FRP Flush Doors and Aluminum Framing System: Glazed doors.

##### **1.2 REFERENCES**

- A. American National Standards Institute:
  - 1. ANSI Z97.1 - Safety Glazing Materials Used in Buildings Safety.
- B. American Society of Civil Engineers:
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International:
  - 1. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.
  - 2. ASTM C1048 - Standard Specification for Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass.
  - 3. ASTM C1193 - Standard Guide for Use of Joint Sealants.
  - 4. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
  - 5. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.
  - 6. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.
- D. Consumer Products Safety Commission:
  - 1. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing.
- E. Glass Association of North America:
  - 1. GANA - Sealant Manual.
  - 2. GANA - Glazing Manual.
- F. National Fenestration Rating Council Incorporated:
  - 1. NFRC 100 - Procedures for Determining Fenestration Product U-Factors.
  - 2. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
  - 3. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.
- G. National Fire Protection Association:
  - 1. NFPA 80 - Standard for Fire Doors, Fire Windows.

2. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.
3. NFPA 257 - Standard on Fire Test for Window and Glass Block Assemblies.

- H. Underwriters Laboratories Inc.:
1. UL 10C - Positive Pressure Fire Tests of Door Assemblies.
  2. UL - Building Materials Directory.

### 1.3 PERFORMANCE REQUIREMENTS

- A. Provide glass and glazing materials for continuity of building enclosure:
1. To maintain continuous air barrier and vapor retarder throughout glazed assembly from glass pane to heel bead of glazing sealant.
- B. Glass Thickness: Select minimum thickness in accordance with ASTM E1300 to resist specified design loads with the following maximum probability of breakage:
1. Vertical Glass: 8 lites per 1000 for wind loads with 3 seconds maximum load duration.
  2. Sloped Glass: 1 lite per 1000 for wind and snow loads with 30 days maximum load duration.
  3. Minimum Thickness: 1/4 inch for exterior glass.
- C. Structural Design: Design in accordance with applicable code for most critical combination of wind, snow, seismic, and dead loads.
- D. Wind Loads: Design and size glass to withstand positive and negative wind loads acting normal to plane of wall, including increased loads at building corners.
1. Design Wind Load: Per ASCE 7.
- E. Exterior Glass Deflection: Maximum of 1/175 of glass edge length or 3/4 inch, which ever is less with full recovery of glazing materials.
- F. Interior Glass Deflection: Maximum differential deflection for two adjacent unsupported edges when 50 plf force is applied to one panel at any point up to 42 inches above finished floor less than thickness of glass.
- G. Thermal and Solar Optical Performance: Measured or calculated in accordance with the following:
1. Maximum U-Values: Comply with ICC IEBC for climate zone in which project is located. Measure in accordance with NFRC 100.
  2. Maximum SHGC: Comply with ICC IEBC for climate zone in which project is located. Measure in accordance with NFRC 200.
  3. Solar Optical Properties: NFRC 300.

### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
1. Glass: Provide structural, physical, and thermal and solar optical performance characteristics, size limitations, special handling or installation requirements.
  2. Glazing Sealants, Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors where exposed.
- C. Design Data:
1. Submit design calculations for glass thicknesses.

- D. Manufacturer's Certificate: Certify sealed insulating glass, meets or exceeds specified requirements.
- E. Installer's Certificate: Certify glass furnished without identification label is installed in accordance with Construction Documents and applicable code.

#### 1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual, GANA Sealant Manual, for glazing installation methods.
- B. Fire Rated Wall Glazing: Rating as indicated on Drawings.
  - 1. Tested Rating: Determined in accordance with ASTM E119.
- C. Fire Rated Window Glazing: Tested in accordance with NFPA 257 and complying with NFPA 80.
  - 1. NFPA 257; adjusted so two-thirds of test specimen is above neutral pressure plane at 10 minutes into test.
- D. Fire Rated Door Glazing: Tested in accordance with one of the following and complying with NFPA 80.
  - 1. NFPA 252; with neutral pressure level at 40 inches maximum above sill at 5 minutes into test.
  - 2. UL 10C.
- E. Apply label from agency approved by authority having jurisdiction to identify each fire rated glass lite.

#### 1.6 QUALIFICATIONS

- A. Installer: Company specializing in performing Work of this section with minimum three years documented experience approved by manufacturer.

#### 1.7 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not install glazing when ambient temperature is less than 50 degrees F.
- C. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

#### 1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.



## PART 2 PRODUCTS

### 2.1 FLOAT GLASS MATERIALS

- A. Tempered Glass (FG-CT): ASTM C1048, Type 1 transparent flat, Quality Q3, Kind FT fully tempered, Condition A uncoated, float glass with horizontal tempering.
  - 1. Furnish tempered glass conforming to CPSC 16 CFR 1201 Category II.

### 2.2 FLOAT GLASS PRODUCTS

- A. Float Glass Manufacturers:
  - 1. ACH Glass Operations.
  - 2. AFG Industries, Inc.
  - 3. Guardian Industries Corp.
  - 4. PPG Industries.
  - 5. Pilkington North America, Inc.
  - 6. Substitutions permitted.
- B. Low E Glass: Annealed, Heat strengthened, and Tempered float glass as specified; Class 1 clear.
  - 1. Clear Low E annealed glass (FG-ECA).
  - 2. Clear Low E heat strengthened glass (FG-ECH).
  - 3. Clear Low E tempered glass (FG-ECT).
  - 4. Minimum Thickness: 1/4 inch.
  - 5. Solar Light Transmittance: 70 percent minimum.
  - 6. Solar Heat Gain Coefficient: 0.38 maximum.

### 2.3 FIRE RESISTIVE GLASS PRODUCTS

- A. Fire Resistive Glass Manufacturers:
  - 1. Technical Glass Products.
  - 2. Substitutions permitted.
- B. Fire-Rated, Safety-Rated Wired Glass (FRG-WG): Transparent polished both surfaces.
  - 1. Thickness: 1/4 inch.
  - 2. Product: WireLiteNT as manufactured by Technical Glass Products.
  - 3. Fire Rating: 20 minute rating as listed in UL Building Materials Directory and approved by authority having jurisdiction for applications indicated.
  - 4. Safety Glazing: Comply with CPSC 16 CFR 1201 Category II.

### 2.4 INSULATING GLASS PRODUCTS

- A. Insulating Glass Manufacturers:
  - 1. AFG Industries, Inc..
  - 2. Arch Aluminum and Glass.
  - 3. Guardian Industries Corp.
  - 4. PPG Industries.
  - 5. Viracon.
  - 6. Substitutions permitted.
- B. Insulating Glass: ASTM E2190 certified by Insulating Glass Certification Council; with silicone sealant edge seal; purge interpane space with dry hermetic air.
  - 1. Total Unit Thickness: 1 inch unless otherwise indicated.
  - 2. Insulating Glass Unit Edge Seal Construction: Aluminum, bent and soldered corners.

- C. Double Pane Insulating Vision Glass (IG-DP):
  - 1. Total Unit Thickness: 1 inch unless otherwise indicated.
  - 2. Outer Pane: Glass Type FG-ECT.
  - 3. Inner Pane: Glass Type FG-CT.

## 2.5 GLAZING SEALANTS

- A. Elastomeric Glazing Sealants: Materials compatible with adjacent materials including glass, insulating glass seals, and glazing channels.
  - 1. Silicone Glazing Sealant: ASTM C920, Type S, Grade NS, Class and Use suitable for glazing application indicated; single component; chemical curing; capable of water immersion without loss of properties; non-bleeding, non-staining, cured Shore A hardness of 15 to 25; compounded by manufacturer specifically for glazing.
    - a. Structural Silicone: Furnish high-modulus structural silicone glazing materials where sealant bonds glass to substrate.
- B. Pre-Formed Glazing Tape: Size to suit application.
  - 1. Preformed butyl compound; 10 to 15 Shore A durometer hardness; coiled on release paper; black color.
    - a. Butyl Corner Sealant: ASTM C920 single component non-skinning butyl compatible with glazing tape; color to match tape.

## 2.6 GLAZING ACCESSORIES

- A. Setting Blocks: Elastomeric material recommended by glass manufacturer, 80 to 90 Shore A durometer hardness, length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.
- B. Spacer Shims: Elastomeric material recommended by glass manufacturer, 50 to 60 Shore A durometer hardness, minimum 3 inch long x one half the height of glazing stop x thickness to suit application.
- C. Glazing Clips: Manufacturer's standard type.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify openings for glazing are correctly sized and within acceptable tolerance.
- C. Verify surfaces of glazing channels or recesses are clean, free of obstructions impeding moisture movement, weeps are clear, and ready to receive glazing.

### 3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant.

### 3.3 INSTALLATION

- A. Perform installation in accordance with GANA Glazing Manual.
  - 1. Glazing Sealants: Comply with ASTM C1193.
  - 2. Fire Rated Openings: Comply with NFPA 80.
- B. Exterior Wet/Dry Method (Preformed Tape and Sealant) Installation:
  - 1. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with compatible butyl sealant.
  - 2. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete continuity of air and vapor seal.
  - 3. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
  - 4. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.
  - 5. Install removable stops, with spacer strips inserted between glazing and applied stops, 1/4 inch below sight line. Place glazing tape on glazing pane or unit with tape 1/4 inch below sight line.
  - 6. Fill gap between glazing and stop with elastomeric glazing sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.
  - 7. Apply cap bead of elastomeric glazing sealant along void between stop and glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.
- C. Interior Dry Method (Tape and Tape) Installation:
  - 1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
  - 2. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
  - 3. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
  - 4. Place glazing tape on free perimeter of glazing in same manner described above.
  - 5. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
  - 6. Knife trim protruding tape.

### 3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Remove glazing materials from finish surfaces.
- C. Remove labels after Work is complete.
- D. Clean glass and adjacent surfaces.

### 3.5 SCHEDULE

- A. Exterior Doors and Aluminum Entrances: Type IG-DP, glazing method recommended by manufacturer.
- B. Interior Non-Fire Rated Wood Doors: Type FG-CT, interior dry method.
- C. Interior Corridor Fire Rated Doors and Frames (20 minute): Type FRG-WG, in accordance with glazing manufacturer's instructions.

**END OF SECTION**

## SECTION 08 91 00

### LOUVERS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section includes fixed louvers, frames and accessories.
- B. Related Sections:
  - 1. Section 07 90 00 - Joint Protection: Sealant at louver perimeter.

##### 1.2 REFERENCES

- A. Air Movement and Control Association International, Inc.:
  - 1. AMCA 500- L - Test Methods for Louvers, Dampers, and Shutters.
- B. ASTM International:
  - 1. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
  - 2. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 3. ASTM E1996 - Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes. California Department of Health Services:

##### 1.3 PERFORMANCE REQUIREMENTS

- A. Design: Design louvers, including comprehensive engineering analysis by a qualified engineer, using structural performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.
  - 1. Wind Loads: Determine loads based on a uniform pressure of 30 lb./sq. ft., acting inward or outward.
- C. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

##### 1.4 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, , and frames.
- C. Product Data: Submit data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.



- D. Samples: Submit samples illustrating finish and color of exterior and interior surfaces for selection.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit Operation and Maintenance Data.

#### 1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with AMCA Certification for Water Penetration, Air Performance, and Wind Driven Rain, in compliance with AMCA 500-L. Attach AMCA seal to louvers.

#### 1.7 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

#### 1.8 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish twenty year manufacturer warranty for louvers.
- C. Warranty: Include coverage for degradation of polyvinylidene fluoride finish.

### PART 2 PRODUCTS

#### 2.1 WALL LOUVERS - DRAINABLE STYLE

- A. Basis-of-Design Product: American Warming and Ventilating; LE-44. Subject to compliance with requirements, provide the specified product or comparable product conforming to the following:
  - 1. Louver Depth: 4 inches.
  - 2. Frame Nominal Thickness: Not less than 0.081 inches.
  - 3. Blade Nominal Thickness: Not less than 0.060 inches.
  - 4. Blade Spacing: 1.63 inches.
  - 5. Blade Orientation: Horizontal.
  - 6. Louver Performance Ratings:
    - a. Free Area: Not less than 8.01 square feet (50.1%) for 48-inch wide by 48-inch high louver.
  - 7. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

#### 2.2 LOUVER SCREENING

- A. General: Provide screen at each exterior louver.
- B. Louver Screen Frames: Same kind and form of metal as indicated for louver to which screens are attached.
- C. Louver Screening: Insect Screen: 18 x 16 size aluminum mesh.

## 2.3 COMPONENTS

- A. Aluminum Extrusions: ASTM B 221M, Alloy 6063-T5.
- B. Aluminum Sheet: ASTM B 209M, Alloy 3003 with temper as required for forming.

## 2.4 ACCESSORIES

- A. Fasteners: Use types and sizes to suit unit installation conditions.
  - 1. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
- B. Sealants: As specified in Section 07 90 00.

## 2.5 FABRICATION

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds concealed from view welds, threaded fasteners, or both, as standard with louver manufacturer unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.
- C. Screens: Install screen mesh in shaped frame, reinforce corner construction.

## 2.6 FACTORY FINISHING

- A. Kynar finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pre-treat, and apply coating to exposed metal surfaces to comply with coating and resin manufactures' written instructions.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify prepared openings are ready to receive Work and opening dimensions are as indicated on shop drawings.

## 3.2 INSTALLATION

- A. Install louvers level and plumb.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- C. Align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

- D. Secure louvers in opening framing with concealed fasteners. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.
- E. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- F. Install screen and frame to interior of louver.
- G. Install perimeter sealant and backing rod in accordance with Section 07 90 00.
- H. Repair damaged finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory and refinish entire unit or provide new units.
- I. Protect galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint.

### 3.3 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements - Final cleaning.
- B. Strip protective finish coverings.
- C. Clean surfaces and components.

**END OF SECTION**

**SECTION 09 21 16**

**GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Gypsum board and joint treatment.

**1.2 REFERENCE STANDARDS**

- A. ASTM International:
  - 1. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
  - 2. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.
  - 3. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
  - 4. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
  - 5. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
  - 6. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
  - 7. ASTM C1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases.
  - 8. ASTM C1047 - Standard Specifications for Accessories for Gypsum Wallboard.
  - 9. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.
  - 10. ASTM C1396/C1396M - Standard Specification for Gypsum Board.
  - 11. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 12. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
  - 13. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
- B. American Society of Civil Engineers:
  - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. Gypsum Association:
  - 1. GA 214 - Recommended Levels of Gypsum Board Finish.
  - 2. GA 216 - Application and Finishing of Gypsum Board.
  - 3. GA 600 - Fire Resistance Design Manual Sound Control.
- D. Intertek Testing Services (Warnock Hersey Listed):
  - 1. WH - Certification Listings.
- E. National Fire Protection Association:
  - 1. NFPA 265 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls, Method B.
  - 2. NFPA 286 - Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Wall and Ceiling Interior Finish.

- F. Tile Council of North America, Inc. (TCNA):
  - 1. TCA Handbook for Ceramic Tile Installation, Current Edition.
- G. Underwriters Laboratories Inc.:
  - 1. UL - Fire Resistance Directory.

### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on metal framing, gypsum board, joint tape; decorative finish, acoustic and accessories.

### 1.4 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C840, GA-214, GA-216 and GA-600 as applicable.

### 1.5 PERFORMANCE REQUIREMENTS

- A. Fire Rated Roof Construction: 1 hour rating in conjunction with Section 05 44 13.
  - 1. Tested Rating: Determined in accordance with ASTM E119.

### 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

## PART 2 PRODUCTS

### 2.1 GYPSUM BOARD ASSEMBLIES

- A. Manufacturer List:
  - 1. Georgia-Pacific Corporation.
  - 2. National Gypsum Co.
  - 3. United States Gypsum Co.
  - 4. Gold Bond Building Products
  - 5. Or equal

### 2.2 COMPONENTS

- A. Gypsum Board Materials: ASTM C1396/C1396M; Type X fire resistant.
  - 1. Standard Gypsum Board: 5/8 inch thick, maximum available length in place; ends square cut, tapered edges.

### 2.3 ACCESSORIES

- A. Gypsum Board Accessories: ASTM C1047; metal; corner beads, edge trim, and expansion joints.
  - 1. Metal Accessories: Galvanized steel.
  - 2. Edge Trim: Type LC, L, and U bead as required.



- B. Joint Materials: ASTM C475/C475M; reinforcing tape, joint compound, and water.
- C. Gypsum Board Screws: ASTM C1002; length to suit application.
  - 1. Screws for Steel Framing: Type S.
  - 2. Screws for Wood Framing: Type W.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify site conditions are ready to receive work and opening dimensions are as indicated on shop drawings.

### 3.2 DEMOLITION

- A. Extend existing gypsum board installations using materials and methods as specified.
- B. Repair and remodel existing gypsum board assemblies which remain or are to be altered.

### 3.3 INSTALLATION

- A. Gypsum Board Installation:
  - 1. Install gypsum board in accordance with ASTM C840, GA-216, and GA-600.
  - 2. Erect single layer standard gypsum board horizontal, with ends and edges occurring over firm bearing. Stagger end joints.
  - 3. Use screws when fastening gypsum board to metal and wood framing.
  - 4. Double Layer Applications: Secure second layer through first with fasteners.
  - 5. Place second layer parallel to first layer. Offset joints of second layer from joints of first layer.
  - 6. Place control joints consistent with lines of building spaces as recommended to prevent cracking in finished surfaces.
  - 7. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.
- B. Joint Treatment:
  - 1. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  - 2. Feather coats on to adjoining surfaces so that camber is maximum 1/32.
  - 3. Taping, filling, and sanding is required at all exposed to view surfaces
  - 4. Taping and filling is required at concealed surfaces.

### 3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Finished Gypsum Board Surface from Flat Surface: 1/8 inch in 10 feet.

**END OF SECTION**

**SECTION 09 30 00**

**TILING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes ceramic, tile for floor and ceramic accessories.
- B. Related Sections:
  - 1. Section 03 35 00 - Concrete Finishing: Troweling of floor slab for tile application.

**1.2 REFERENCES**

- A. American National Standards Institute:
  - 1. ANSI A108.1 - Installation of Ceramic Tile, A collection.
  - 2. ANSI A108.5 - Specifications for Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
  - 3. ANSI A108.10 - Specifications for Installation of Grout in Tilework.
  - 4. ANSI A118.4 - Latex-Portland Cement Mortar.
  - 5. ANSI A118.6 - Ceramic Tile Grouts.
- B. Tile Council of America:
  - 1. TCA - Handbook for Ceramic Tile Installation.

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit instructions for using grouts.
- C. Samples:
  - 1. Submit tile and grout samples illustrating pattern, and color variations.
  - 2. Submit samples of external bullnose metal trim for selection.

**1.4 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

**1.5 QUALITY ASSURANCE**

- A. Perform Work in accordance with TCA Handbook and ANSI A108 Series/A118 Series.

**1.6 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.

- B. Installer: Company specializing in performing Work of this section with minimum three years documented experience.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Protect grouts from freezing or overheating.

#### 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not install adhesives and grouts in unventilated environment.
- C. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

### PART 2 PRODUCTS

#### 2.1 TILE

- A. Porcelain Tile: "Continental Slate" simulated slate as manufactured by Dal Tile (no substitutions); ANSI A137.1, conforming to the following:
  - 1. Size: 18 x 18 x 1/4 inch.
  - 2. Shape: Square.
  - 3. Surface Finish: Unpolished.
  - 4. Color: As selected.
- B. Base: Cove Base, same as floor tile.
  - 1. Length: 12 inch.
  - 2. Height: 6 inch.

#### 2.2 ACCESSORIES

- A. Mortar Materials:
  - 1. Mortar Bond Coat Materials:
    - a. Latex-Portland Cement type: ANSI A118.4.
- B. Grout Materials:
  - 1. Grout: Latex-Portland cement type as specified in ANSI A118.6.
    - a. Color: As selected.
- C. Transitions at changes in floor finish: Extruded aluminum, with integral edge strip, where floor tile abuts dissimilar flooring materials (ie. carpeting, VCT).

## PART 3 ECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify surfaces are ready to receive work.

### 3.2 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces.
- C. Seal substrate surface cracks with filler.

### 3.3 INSTALLATION

- A. Install tile, thresholds and grout in accordance with applicable requirements of ANSI A108.1 through A108.10, and TCA Handbook recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Place thresholds at exposed tile edges.
- D. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor, base and wall joints.
- E. Place tile with joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
  - 1. Porcelain Tile: 1/4 inch.
- F. Form internal angles square.
- G. Install ceramic accessories rigidly in prepared openings.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep expansion and control joints free of adhesive or grout. Apply sealant to joints.
- J. Allow tile to set for a minimum of 48 hours prior to grouting.
- K. Grout tile joints.
- L. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
- M. Installation - Floors - Thin-Set Methods:
  - 1. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat.

3.4 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Clean tile and grout surfaces.

3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting installed construction.
- B. Do not permit traffic over finished floor surface for 4 days after installation.

**END OF SECTION**



**SECTION 09 51 13**

**ACOUSTICAL PANEL CEILINGS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Acoustic panels.
  - 2. Suspended metal grid ceiling system and perimeter trim.
- B. Related Requirements:
  - 1. Section 23 37 00 - Air Outlets and Inlets: Air diffusion devices in ceiling system.
  - 2. Section 26 51 00 - Interior Lighting: Light fixtures in ceiling system.
  - 3. Section 28 31 00 - Fire Detection and Alarm: Fire alarm components in ceiling system.

**1.2 REFERENCE STANDARDS**

- A. ASTM International:
  - 1. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
  - 2. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
  - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Ceilings and Interior Systems Construction Association:
  - 1. CISCA - Acoustical Ceilings: Use and Practice.

**1.3 SEQUENCING**

- A. Section 01 10 00 - Summary: Requirements for sequencing.
- B. Sequence Work to ensure acoustic ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.
- C. Install acoustic units after interior wet work is dry.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on metal grid system components, acoustic units and panels.
- C. Samples:
  - 1. Submit samples illustrating material and finish.
  - 2. Submit samples color samples of grid for selection where colored grid is specified.
- D. Manufacturer's Instructions: Submit special procedures, and perimeter conditions requiring special attention.

## 1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for maintenance materials.
- B. Extra Stock Materials:
  - 1. Furnish 2% percent of total acoustic unit area of extra tile panels to Owner.

## 1.6 QUALITY ASSURANCE

- A. Conform to Cisca requirements.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

## 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

## 1.8 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustic unit installation.

# PART 2 PRODUCTS

## 2.1 SUSPENDED ACOUSTICAL CEILINGS

- A. Manufacturer List:
  - 1. United States Gypsum Company as basis of design.
  - 2. No substitutions.
- B. Performance / Design Criteria:
  - 1. Suspension System: Rigidly secure acoustic ceiling system including integral mechanical and electrical components with maximum deflection of 1/240

## 2.2 COMPONENTS

- A. Acoustic Panels to match existing (SAT-1): ASTM E1264, Type III, Form 2, Pattern CDE, Equal to Radar as Manufactured by USG Interior Systems, conforming to the following:
  - 1. Size: 24 x 24 inches.
  - 2. Thickness: 5/8 inches.
  - 3. Composition: Mineral.
  - 4. Light Reflectance: 80 percent minimum.
  - 5. Edge: SQ
  - 6. Surface Color: White.

7. Surface Finish: Perforated (small holes), fissured, lightly textured.

B. Grid:

1. Non-fire Rated Grid: ASTM C635, intermediate duty; exposed T; components die cut and interlocking.
2. Grid Materials: Cold rolled aluminum.
3. Exposed Grid Surface Width: 15/16 inch.
4. Perimeter Molding Width: Match grid width.
5. Grid Finish: White where acoustic panels are scheduled, color to be selected where acoustic panels are to be omitted.
6. Accessories: Trim for interior square corners.
7. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.

## 2.3 ACCESSORIES

- A. Touch-up Paint: Type and color to match acoustic and grid units.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify layout of hangers will not interfere with other work.

### 3.2 INSTALLATION

A. Lay-In Grid Suspension System:

1. Install suspension system in accordance with ASTM C635, ASTM C636 and as supplemented in this section.
2. Locate system on room axis according to reflected plan.
3. Install after major above ceiling work is complete. Coordinate location of hangers with other work.
4. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
5. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest affected hangers and related carrying channels to span extra distance.
6. Do not support components on main runners or cross runners when weight causes total dead load to exceed deflection capability. Support fixture loads by supplementary hangers located within 6 inches of each corner; or support components independently.
7. Do not eccentrically load system, or produce rotation of runners.
8. Perimeter Molding:
  - a. Install edge molding at intersection of ceiling and vertical surfaces.
  - b. Use longest practical lengths.
  - c. Overlap and rivet corners.
  - d. Install at junctions with other interruptions.
9. Install straight trim cover at interior grid corners.

B. Acoustic Units:

1. Fit acoustic units in place, free from damaged edges or other defects detrimental to appearance and function.
2. Lay directional patterned units one way with pattern parallel to shortest room axis. Fit border trim neatly against abutting surfaces.
3. Install units after above ceiling work is complete.
4. Install acoustic units level, in uniform plane, and free from twist, warp, and dents.
5. Cutting Acoustic Units:
  - a. Cut to fit irregular grid and perimeter edge trim.
  - b. Cut square reveal edges to field cut units.

### 3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- C. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**END OF SECTION**

**SECTION 09 68 16**

**SHEET CARPETING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Sheet carpet direct-glued to substrate.
  - 2. Accessories.
- B. Related Sections:
  - 1. Section 09 30 00 - Tiling: Termination edging of adjacent floor finish.

**1.2 PRICE AND PAYMENT PROCEDURES**

- A. Sheet Carpet Allowance: Allowance includes furnishing sheet carpet material. Installation and accessory materials are included in this section and is part of Contract Sum/Price.

**1.3 REFERENCE STANDARDS**

- A. ASTM International:
  - 1. ASTM D2859 - Standard Specification for Ignition Characteristics of Finished Textile Floor Covering Materials.
- B. Carpet and Rug Institute:
  - 1. CRI Carpet Installation Standard - Standard for Installation of Commercial Carpet.
  - 2. CRI Model Specifications for Commercial Carpets.
- C. Consumer Products Safety Commission:
  - 1. CPSC 16 CFR 1630 - Standard for the Surface Flammability of Carpets and Rugs.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Shop Drawings: Indicate seaming plan, method of joining seams, direction of carpet pile and pattern, location of edge moldings and edge bindings.
  - 1. Submit samples of edge strips and base material for each color specified.

**1.5 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Operation and Maintenance Data: Submit maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.



## 1.6 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
  - 1. Floor Finishes: Comply with one of the following:
    - a. Class I, minimum 0.45 watts/sq cm when tested in accordance with NFPA 253.
    - b. CPSC 16 CFR 1630 and ASTM D 2859.

## 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installation must be performed by a firm with not less than five (5) years of experience in installation of commercial carpet, by methods similar to those required for this project.
  - 1. FCIB or IFCI certified carpet installers.
- C. Installation must be performed by an installer that is pre-approved in writing by the manufacturer. The agreement between the manufacturer and the installation company must specifically address all installation procedures and materials in order to coordinate with warranties offered by the manufacturer.

## 1.8 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Store materials in area of installation for 48 hours prior to installation.
- C. Maintain minimum 70 degrees F ambient temperature 3 days prior to, during and 24 hours after installation.
- D. Ventilate installation area during installation and for 3 days after installation.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Carpeting Material Allowance: Include an allowance for the purchase of carpeting. Owner will select carpeting for purchase by the Contractor. Any adjustment (add or deduct) in the bid price will be made following purchase by Change Order. Refer to Section 01 20 00 for allowance amount and basis of cost.
- B. Resilient Base:
  - 1. Base: FS SS-W-40, Type 2 vinyl; Vinyl; top set coved. Patterns and colors as selected by Architect.
    - a. Height: 4 inch.
    - b. Thickness: 1/8 inch thick.
    - c. Length: 4 foot sections.
    - d. Manufacturers:
      - 1) Burke Flooring Products.
      - 2) Johnsonite - Johnson Rubber Company.
      - 3) Kentile Floors, Inc.

- C. Resilient Moldings and Edge Strips: Vinyl, color as selected.

## 2.2 ACCESSORIES

- A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.
- B. Floor Primer: Manufacturer's approved floor primer applied to all areas that are to receive carpeting.
- C. Seam Adhesive: Recommended by manufacturer.
- D. Contact Adhesive: Recommended by manufacturer for installation of carpeting [and base].

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify that substrate surfaces are smooth and flat with maximum variation of 1/8" inch in 10' ft. and are ready to receive work. Correct any deviations in substrate to the satisfaction of the Owner/Architect.
- C. Verify concrete floors are ready for sheet carpet installation by testing for moisture emission rate and alkalinity. Obtain instructions when test results are not within specified limits.
  - 1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
  - 2. Alkalinity: pH range of 5-9.

### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

### 3.3 INSTALLATION - CARPET

- A. Install sheet carpet in accordance with CRI Carpet Installation Standard and manufacturers instructions.
- B. Installation of carpet must proceed in strict accordance with manufacturer's printed installation instructions. This includes the use of adhesives and seam sealers supplied by the manufacturer.
- C. Verify sheet carpet match before cutting to ensure minimal variation between dye lots.

- D. Lay out sheet carpet and locate seams in accordance with CRI Carpet Installation Standard section 6.2:
  - 1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
  - 2. Do not locate seams perpendicular through door openings.
  - 3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
  - 4. Locate change of color or pattern between rooms under door centerline.
  - 5. Provide monolithic color, pattern, and texture match within each contiguous area.
- E. Install sheet carpet tight and flat on subfloor, well fastened at edges, with uniform appearance.
- F. Double cut sheet carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven sheet carpet immediately.
- G. Direct Glue-Down Installation: CRI Carpet Installation Standard Section 13.
  - 1. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press sheet carpet into adhesive.
  - 2. Apply seam adhesive. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.
  - 3. Roll with appropriate roller for complete contact of adhesive to sheet carpet backing.
- H. Trim sheet carpet neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges. [Bind cut edges where not concealed by edge strips.]

### 3.4 INSTALLATION – RESILIENT BASE

- A. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
- B. Miter internal corners. Wrap base around bullnose CMU at external corners.
- C. Install base on solid backing. Bond tight to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.
- E. Install base on all casework kick boards.

### 3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- C. Clean and vacuum sheet carpet surfaces.

### 3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Do not permit traffic over unprotected floor surface.

- C. Cover carpeting in traffic areas with protective non-staining building paper. Do not use plastic sheeting.

**END OF SECTION**

**SECTION 09 90 00**

**PAINTING AND COATING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section includes surface preparation and field application of paints, [stains,] [varnishes,] and other coatings.
- B. Related Sections:
  - 1. Section 22 05 53 - Identification for Plumbing Piping and Equipment.
  - 2. Section 23 05 53 - Identification for HVAC Piping and Equipment.
  - 3. Section 26 05 53 - Identification for Electrical Systems.

**1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.
  - 2. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.
  - 3. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. Painting and Decorating Contractors of America:
  - 1. PDCA - Architectural Painting Specification Manual.
- C. SSPC: The Society for Protective Coatings:
  - 1. SSPC - Steel Structures Painting Manual.

**1.3 DEFINITIONS**

- A. Conform to ASTM D16 for interpretation of terms used in this section.

**1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data: Submit data on finishing products.
- C. Samples:
  - 1. Submit paper chip samples illustrating range of colors available for each surface finishing product scheduled.
- D. Manufacturer's Installation Instructions: Submit special surface preparation procedures, and substrate conditions requiring special attention.

**1.5 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.

- B. Operation and Maintenance Data: Submit data on cleaning, touch-up, and repair of painted and coated surfaces.

#### 1.6 QUALITY ASSURANCE

- A. Surface Burning Characteristics:
  - 1. Fire Retardant Finishes: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

#### 1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years experience.
- B. Applicator: Company specializing in performing work of this section with minimum three years documented experience and approved by manufacturer.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Paint Materials: Store at minimum ambient temperature of 45 degrees F and maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

#### 1.9 ENVIRONMENTAL REQUIREMENTS

- A. Section 01 60 00 - Product Requirements.
- B. Do not apply materials when surface and ambient temperatures are outside temperature ranges required by paint product manufacturer.
- C. Do not apply exterior coatings during rain or snow when relative humidity is outside humidity ranges, or moisture content of surfaces exceed those required by paint product manufacturer.
- D. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.
- E. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.
- F. Provide lighting level of 80 ft candle measured mid-height at substrate surface.

#### 1.10 SEQUENCING

- A. Section 01 10 00 - Summary: Work sequence.



- B. Sequence application to the following:
  - 1. Do not apply finish coats until paintable sealant is applied.
  - 2. Back prime wood trim before installation of trim.

#### 1.11 WARRANTY

- A. Section 01 70 00 - Execution and Closeout Requirements: Product warranties and product bonds.
- B. Furnish five year manufacturer warranty for paints and coatings.

#### 1.12 EXTRA MATERIALS

- A. Section 01 70 00 - Execution and Closeout Requirements: Spare parts and maintenance products.
- B. Supply 1 gallons of each color, type, and surface texture.
- C. Label each container with color, type, texture in addition to manufacturer's label.

### PART 2 PRODUCTS

#### 2.1 PAINTS AND COATINGS

- A. Manufacturers: Paint
  - 1. Glidden Coatings and Resins
  - 2. Benjamin Moore and Company
  - 3. Sherwin Williams Company
  - 4. Valspar Corporation
  - 5. Devoe Paint Co.
  - 6. Fuller-O'Brien.
  - 7. PPG Architectural Finishes.

#### 2.2 COMPONENTS

- A. Coatings: Ready mixed, except field catalyzed coatings. Prepare coatings:
  - 1. To soft paste consistency, capable of being readily and uniformly dispersed to homogeneous coating.
  - 2. For good flow and brushing properties.
  - 3. Capable of drying or curing free of streaks or sags.
- B. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve finishes specified; commercial quality.
- C. Patching Materials: Latex filler.
- D. Fastener Head Cover Materials: Latex filler.

#### 2.3 FINISHES

- A. Exterior Paint Systems (EPS-1):
  - 1. System EPS-1: Gloss Alkyd Enamel:
    - a. 1<sup>st</sup> Coat; (Primer):

- 1) Ferrous Metal: Red oxide primer (TT-P-645).
    - 2) Galvanized Metal: Galvanized primer (TT-P-641).
  - b. 2<sup>nd</sup> Coat and 3<sup>rd</sup> Coat:
    - 1) Gloss Alkyd Enamel (TT-E-489, Class A).
- B. Exterior Transparent Finish (ETF-1):
  1. System ETF-1: Solid Alkyd/Acrylic Stain.
    - a. 1<sup>st</sup> prefinish and back-paint.
    - b. 2<sup>nd</sup> and 3<sup>rd</sup> Coat; after installation of prefinished materials.
  2. Colors:
    - a. Wood Siding: Match Rubbol Solid #156 Cedar by Sikkens.
    - b. Wood Shingles: Match Rubbol Solid #212 Fawn by Sikkens.
    - c. Wood Trim: Match Rubbol Solid #213 Butternut by Sikkens.
  - 3.
- C. Exterior Transparent Finish (ETF-2):
  1. System ETF-2: Semi Transparent Exterior Polyurethane.
    - a. 1<sup>st</sup> and 2<sup>nd</sup> Coat; Semi Transparent Exterior Polyurethane
- D. Interior Paint Systems IPS-1:
  1. Latex Base, Satin Finish:
    - a. 1<sup>st</sup> Coat; (Primer):
      - 1) Gypsum Drywall: Latex Primer (TT-P-650).
      - 2) Concrete Masonry Units: Surface Filler (TT-F-1098).
      - 3) Concrete: Latex Primer (TT-P-650).
    - b. 2<sup>nd</sup> Coat and 3<sup>rd</sup> Coat: Latex base emulsion, semi-gloss (TT-P-1511). Color as selected by Architect.
- E. Interior Paint System IPS-2:
  1. Semi-Gloss Enamel:
    - a. 1<sup>st</sup> Coat; (Primer)
      - 1) Ferrous metal: Red oxide primer (TT-E-506).
      - 2) Galvanized metal: Galvanized primer (TT-P-641).
    - b. 2<sup>nd</sup> Coat: Ferrous Metal and Galvanized Metal: Enamel Undercoater (TT-E-543).
    - c. 3<sup>rd</sup> Coat: Odorless Alkyd Enamel, Semi-Gloss (TT-E-509).
- F. Interior Transparent Finish System ITF:
  1. System ITF; Oil Stain and Satin Finish.
    - a. 1<sup>st</sup> Coat: Open grained wood; Paste wood filler.
    - b. 2<sup>nd</sup> Coat: Interior Oil Stain.
    - c. 3<sup>rd</sup> Coat: Elkyd (Sanding Sealer).
    - d. 4<sup>th</sup> and 5<sup>th</sup> Coat: Elkyd Satin Finish.
- G. Floor Coating FAF:
  1. Two-part Epoxy Coating with decorative chips and non-skid additive:
    - a. 1<sup>st</sup> Coat:
      - 1) Cleaner and Degreaser.
    - b. 2<sup>nd</sup> Coat:
      - 1) Two-part Epoxy with non-skid additive. Color as selected by Architect.
    - c. 3<sup>rd</sup> Coat:
      - 1) Decorative flake chips.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify surfaces and substrate conditions are ready to receive Work as instructed by product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report conditions capable of affecting proper application.
- D. Test shop applied primer for compatibility with subsequent cover materials.
- E. Measure moisture content of surfaces using electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
  - 1. Plaster and Gypsum Wallboard: 12 percent.
  - 2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
  - 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
  - 4. Exterior Wood: 15 percent, measured in accordance with ASTM D4442.
  - 5. Concrete Floors: 8 percent.

### 3.2 PREPARATION

- A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.
- B. Surfaces: Correct defects and clean surfaces capable of affecting work of this section. Remove or repair existing coatings exhibiting surface defects.
- C. Marks: Seal with shellac those which may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Aluminum Surfaces Scheduled for Paint Finish: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.
- F. Asphalt, Creosote, or Bituminous Surfaces Scheduled for Paint Finish: Remove foreign particles to permit adhesion of finishing materials. Apply compatible sealer or primer.
- G. Insulated Coverings: Remove dirt, grease, and oil from canvas and cotton.
- H. Concrete Floors: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- I. Copper Surfaces Scheduled for Paint Finish: Remove contamination by steam, high pressure water, or solvent washing. Apply vinyl etch primer immediately following cleaning.
- J. Copper Surfaces Scheduled for Natural Oxidized Finish: Remove contamination by applying oxidizing solution of copper acetate and ammonium chloride in acetic acid. Rub on repeatedly for required effect. Once attained, rinse surfaces with clear water and allow to dry.

- K. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- L. Galvanized Surfaces: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.
- M. Concrete and Unit Masonry Surfaces Scheduled to Receive Paint Finish: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.
- N. Plaster Surfaces: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- O. Uncoated Steel and Iron Surfaces: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by [hand] [power tool] wire brushing or sandblasting; clean by washing with solvent. Apply treatment of phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Spot prime paint after repairs.
- P. Shop Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. [Prime metal items including shop primed items.]
- Q. Interior Wood Items Scheduled to Receive Paint Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats.
- R. Interior Wood Items Scheduled to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats.
- S. Exterior Wood Scheduled to Receive Paint Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior paintable caulking compound after prime coat has been applied.
- T. Exterior Wood Scheduled to Receive Transparent Finish: Remove dust, grit, and foreign matter; seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes with tinted exterior caulking compound after sealer has been applied.
- U. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.
- V. Wood Doors Scheduled for Painting: Seal wood door top and bottom edge surfaces with clear sealer.
- W. Metal Doors Scheduled for Painting: Prime metal door top and bottom edge surfaces.

### 3.3 EXISTING WORK

- A. Extend existing paint and coatings installations using materials and methods compatible with existing installations and as specified.

### 3.4 APPLICATION

- A. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- B. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless specified otherwise.
- C. Sand wood and metal surfaces lightly between coats to achieve required finish.
- D. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- E. Where clear finishes are required, tint fillers to match wood. Work fillers into grain before set. Wipe excess from surface.
- F. Prime concealed surfaces of interior and exterior woodwork with primer paint.
- G. Prime concealed surfaces of interior wood surfaces scheduled to receive stain or varnish finish with gloss varnish reduced 25 percent with thinner.
- H. Finishing Mechanical And Electrical Equipment:
  - 1. Refer to Section 22 05 53, Section 23 05 53, and Section 26 05 53, for schedule of color coding and identification banding of equipment, duct work, piping, and conduit.
  - 2. Paint shop primed equipment.
  - 3. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
  - 4. Prime and paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are shop finished.
  - 5. Paint interior surfaces of air ducts visible through grilles and louvers with one coat of flat black paint to visible surfaces. Paint dampers exposed behind louvers, grilles, to match face panels.
  - 6. Paint exposed conduit and electrical equipment occurring in finished areas.
  - 7. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
  - 8. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements specified in respective mechanical and electrical sections.
  - 9. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

### 3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Final cleaning.
- B. Collect waste material which may constitute fire hazard, place in closed metal containers, and remove daily from site.

### 3.6 SCHEDULE - SHOP PRIMED ITEMS FOR SITE FINISHING

- A. Exterior shop primed plumbing, mechanical, or electrical items requiring field finishing: EPS-1.

3.7 SCHEDULE - EXTERIOR SURFACES

- A. Wood siding, trim boards, band boards and corner boards: EFT-1.
- B. Wood column covers: ETF-2.
- C. Steel columns concealed by wood column covers: EFP-1.
- D. Guard posts: EPS-1.

3.8 SCHEDULE - INTERIOR SURFACES

- A. Standing and running trim: ITF-1.
- B. Interior surfaces of wood window frames: ITF-1.
- C. Gypsum board and concrete masonry unit wall surfaces as scheduled: IPS-1.
- D. Hollow metal door frames (with no exterior exposure): IPS-2.
- E. Concrete floors as scheduled: FAF
- F. Exposed to view mechanical and electrical items specified to be field finished: IPS-2.

**END OF SECTION**



## **SECTION 10 44 00**

### **FIRE PROTECTION SPECIALTIES**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section includes fire extinguishers and brackets for wall mounting.

##### **1.2 REFERENCES**

- A. National Fire Protection Association:
  - 1. NFPA 10 - Standard for Portable Fire Extinguishers.
- B. Underwriters Laboratories Inc.:
  - 1. UL - Fire Protection Equipment Directory.

##### **1.3 PERFORMANCE REQUIREMENTS**

- A. Conform to NFPA 10 and applicable code.
- B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.
- C. Provide fire extinguisher cabinets classified and labeled by Underwriters Laboratories Inc. for purpose specified and indicated.

##### **1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, location, and.
- C. Product Data: Submit extinguisher operational features, color and finish, and anchorage details.

##### **1.5 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Closeout procedures.
- B. Operation and Maintenance Data: Submit test, refill or recharge schedules and re-certification requirements.

##### **1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: Environmental conditions affecting products on site.
- B. Do not install extinguishers when ambient temperature are capable of freezing extinguisher ingredients.

## PART 2 PRODUCTS

### 2.1 FIRE EXTINGUISHERS

- A. Manufacturers:
  - 1. JL Industries Cosmic Extinguisher as basis for design.
  - 2. The Ansul Company.
  - 3. Larsen's Manufacturing Co.
  - 4. Nystrom Products Co.
  - 5. Potter Roemer.
  - 6. Or equal.
- B. Multi-Purpose Chemical Type: Cast steel tank, with pressure gage; size and classification scheduled in 3.3, located as shown in Drawings.
- C. Extinguisher Finish: Steel, enamel to red color.

### 2.2 ACCESSORIES

- A. Extinguisher Brackets: Designed to fit extinguisher and hold extinguisher firmly and securely, equal to Mark type by J.L. Industries.

## PART 3 EXECUTION

### 3.1 INSTALLATION

- A. Install wall brackets, maximum 48 inches from finished floor to top of extinguisher handle.
- B. Secure rigidly in place.
- C. Place extinguisher on wall brackets.

### 3.2 SCHEDULE

- A. Provide 3A-40BC Extinguisher and Extinguisher Bracket in Archives 129C.

**END OF SECTION**

## SECTION 12 32 16

### MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Plastic-laminate-clad casework.
  - 2. Plastic laminate finished counter tops.
  - 3. Cabinet hardware.
- B. Related Requirements:
  - 1. Section 07 90 00 – Joint Protection: Sealants for countertop installation.
  - 2. Section 15 41 00 – Plumbing Fixtures: Plumbing fixtures.
  - 3. Section 09 90 00 - Painting and Coating: Field Finishing.
  - 4. Section 12 36 40 – Stone Countertops: Granite countertops, curbs, back splashes, and panels.

##### 1.2 REFERENCE STANDARDS

- A. American National Standards Institute:
  - 1. ANSI A156.9 - Cabinet Hardware.
  - 2. ANSI A208.1 - Mat-Formed Wood Particleboard.
- B. Architectural Woodwork Institute:
  - 1. AWI AWS - Architectural Woodwork Standards.
- C. ASTM International:
  - 1. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
  - 2. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
  - 3. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- D. Hardwood Plywood and Veneer Association:
  - 1. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood.
- E. National Electrical Manufacturers Association:
  - 1. NEMA LD 3 - High Pressure Decorative Laminates.

##### 1.3 SUBMITTALS

- A. Section 01 33 00 - Submittal Procedures: Submittal procedures.
- B. Product Data:
  - 1. Submit catalog showing construction details, material specifications and hardware specifications of all items used.
- C. Shop Drawings:
  - 1. Submit three sets of laser quality, 11 x 17 shop drawings consisting of:
    - a. Finish, hardware, construction options selection sheet.
    - b. Small scale floor plan showing casework in relation to the building.

- c. Large scale elevations and plan views.
  - d. Cross-sections; service runs; locations of blocking within walls (blocking is done by others); rough-in requirements and, sink centerlines.
- D. Samples:
- 1. Submit samples of laminates and shop finishes requiring selection of finish, color, texture and other properties.
    - a. Submit one set of laminate color brochures from standard laminate manufacturers Wilsonart, Formica, Pionite, and Nevamar.
  - 2. Submit one edge color sample chain.
  - 3. Submit one set of interior colors samples.
  - 4. Submit samples of drawer pulls, and hinges illustrating hardware finish.

#### 1.4 CLOSE-OUT SUBMITTALS

- A. Section 01 70 00 - Execution and Close-out Requirements: Requirements for submittals.
- B. Submit manufacturer's warranty.

#### 1.5 QUALITY ASSURANCE

- A. Unless otherwise indicated, comply with AWI, for grades of interior architectural woodwork, construction, finishes and other requirements.
- B. Surface Burning Characteristics: Maximum 25/450 flame spread/smoke developed index when tested in accordance with ASTM E84.

#### 1.6 QUALIFICATIONS

- A. Fabricator: Company specializing in fabricating products specified in this section with minimum three years documented experience.
- B. Installer: Manufacturer's authorized representative if other than manufacturer..

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Delivery and Acceptance Requirements:
  - 1. Deliver casework once painting, and similar requirements have been completed that will not damage casework. This includes ensuring spaces are enclosed and weather tight.
  - 2. All casework shall be blanket wrapped for protection during shipping.
- C. Storage and Handling:
  - 1. Casework must be protected from dust, dirt and/or other trades.
  - 2. Countertops shall be stacked, properly supported and spaced evenly to avoid warping.

#### 1.8 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.

- B. Do not deliver or install the casework until concrete, masonry, and drywall/plaster work is dry; ambient relative humidity is maintained between 25 – 55% prior to delivery and throughout the life of installation; and the temperature is controlled above 55°F.
- C. Casework shall not be stored or installed in non-climate controlled conditions.

#### 1.9 WARRANTY

- A. Provide Limited Lifetime warranty to the original owner against defective material and workmanship.

#### 1.10 EXISTING CONDITIONS

- A. Manufacturer and/or Manufacturer's representative shall verify all critical building dimensions prior to fabrication. Indicate field measurements on shop drawings.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

- A. Fabricators (Basis of Design):
  - 1. Case Systems
- B. Other approved Fabricators subject to compliance with specified requirements:
  - 1. Cabinets by Robert, Traverse City, MI
  - 2. Cedar Valley Cabinets, Traverse City, MI.
  - 3. Eyewood Design, Interlochen, MI.
  - 4. Substitutions permitted under section 01 60 00.
- C. Plastic Laminate Casework:
  - 1. Particleboard Core:
    - a. All particleboard shall be Grade M-3 and shall meet or exceed all requirements as set by ANSI A208.1-2009.
      - 1) Density: 40-50 lbs/cu.ft
      - 2) Moisture Content: 10% Max
      - 3) Modulus of Rupture: 2393 psi
      - 4) Modulus of Elasticity: 398,900 psi
      - 5) Internal Bond: 80 psi
      - 6) Hardness: 500 pounds Min
      - 7) Linear Expansion: 0.35%
      - 8) Thickness Tolerance: +/- 0.008"
      - 9) Face Screw Holding: 247 pounds Min
- D. Joinery:
  - 1. Mechanical Joinery:
    - a. All cabinet body components shall be secured utilizing concealed interlocking mechanical fasteners as approved by the AWI Quality Standards 8th Edition -2003 Sections 400A-T-12, 400B-T10 and 1600-T-11.
    - b. Approved Fabricators standard joinery is acceptable.
- E. Surface Material:

1. Acceptable laminate color, pattern, and finish as either scheduled or otherwise indicated on drawings or as selected by Architect from manufacturer's standards types and nominal thickness including:
  - a. Vertical surface decorative grade VGS: .028" thick.
  - b. General purpose decorative grade HGS: .048" thick.
  - c. Cabinet decorative liner grade CLS: .020" thick.
  - d. Non-decorative backer grade BKH: .028" thick.
  - e. Thermally fused melamine laminate.
  - f. Chemical resistant decorative laminate.

F. Edge banding:

1. PVC
  - a. Shall be applied utilizing hot melt adhesive and radiused by automatic trimmers. Edging shall be available in a variety of color options.

G. Adhesives:

1. PVA
  - a. Adhesive shall be mechanically applied.
  - b. NAUF, no VOC
2. EVA
  - a. Adhesive shall be mechanically applied.

## 2.2 FABRICATION

A. General Cabinet Body Construction:

1. Cabinet Box Style shall be Standard - Reveal Overlay.
2. Cabinet Box Core shall be Standard - Particleboard.
3. Bottoms and ends of cabinets and tops and bottoms of wall cabinets (all structural components) shall be 1-inch thick.
4. All panels shall be manufactured with balanced construction.
5. Fixed interior components such as fixed shelves, dividers, and cubicle compartments shall be full 3/4" thick and attached with concealed interlocking mechanical fasteners.
6. Cabinet body exterior surfaces shall be: Standard - VGS
7. Cabinet finished interior options shall be: Finished at Opens.
8. Cabinet body interior surfaces shall be: Standard – Thermally Fused.
9. Cabinet body front edge shall be: Standard – .020" PVC.
10. Mounting stretchers are 3/4" thick structural components fastened to end panels and back by mechanical fasteners, and are concealed by the cabinet back.
11. When the rear of a cabinet is exposed, a separate finished 3/4" thick decorative laminate back panel may be specified.
12. Backs of cabinets are 1/2" thick surfaced both sides for balanced construction and fully captured on both sides and bottom.
13. A 5mm diameter row hole pattern 32mm (1-1/4") on center shall be bored in cabinet ends for adjustable shelves. This row hole pattern shall also serve for hardware mounting and replacement and/or relocation of cabinet components.
14. An upper 3/4" thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. This stretcher is also fastened to the full sub-top thus capturing the back panel.

B. Base Cabinet Construction:

1. All base cabinets, except sink cabinets, shall have a solid 3/4" thick sub-top of core (as specified above), fastened between the ends with interlocking mechanical fasteners.



2. Sink cabinets with a split removable back panel shall have a formed metal front brace, and steel corner gussets shall be utilized to support and securely fasten top in all four corners. Front brace shall be powder coated black.
- C. Tall Cabinet Construction:
1. All tall cabinets shall be provided with an intermediate fixed shelf to maintain internal dimensional stability under heavy loading conditions as well as an intermediate 3/4" thick stretcher located behind the back panel and be secured between the cabinet ends with mechanical fasteners. The stretcher shall be secured to the shelf through the back with #8 x 2" plated flat head screws.
- D. Wall Cabinet Construction:
1. All wall cabinet bottoms shall be 1-inch thick core (type specified above), mechanically fastened between end panels and secured to the bottom back stretcher. A lower 3/4" thick stretcher shall be located behind the back panel and attached between the end panels with mechanical fasteners. The stretcher is also secured through the back and into the cabinet bottom.
  2. All wall cabinet exterior bottoms shall be: Match Exterior Surface.
  3. All wall cabinet tops shall be: Standard – 3/4 inch.
- E. Tall and Wall Cabinet Top Edges shall be: .020" PVC at Top of End Panels, Stretchers & Back.
- F. Tall, Wall and Hutch Tops shall be: CLS to Match Standard Interior.
- G. Tall, Wall and Hutch Upper Door Reveal shall be: Standard -15mm Reveal.
- H. Toe Base of Cabinet:
1. Individual bases shall be constructed of: Standard: Particleboard factory applied to base and tall cabinets and shall support and carry the load of the end panels, and the cabinet bottom, directly to the floor. The base shall be let in from the sides and back of the cabinet to allow cabinets to be installed tightly together and tight against a wall, also to conceal the top edge of applied vinyl base molding by Section 09 65 00. There shall be a front to back center support for all bases over 30" wide.
  2. Toe Base Height: 4 inch.
  3. Toe Base: Standard - attached.
- I. Drawer Fronts and Solid Doors:
1. All drawer fronts and solid door components shall be: Standard - Particleboard surfaced both sides for balanced construction.
  2. Options shall be: Standard - HPL Door and Drawer Front Exterior and Grade CLS on Interior.
  3. Surfaces shall be: Standard - HPL Grade VGS.
  4. Door and drawer front edge shall be: Standard - 3mm PVC.
- J. Drawer Boxes:
1. Drawer box constructed with a full 1/2" thick core shall be: Standard – Particleboard, non-racking, non-deflecting platform bottom that is carried directly by "L" shaped, bottom mount drawer glides.
  2. Drawer box at finished interiors shall be: Standard - Surface to Match Standard Interior.
  3. Slides are secured with 1-1/4" long screws driven through the platform and into the sides. Drawer box sides, backs, sub-front, and bottom shall be 1/2". The top edge shall be nominal 1mm (.020") PVC matching the drawer color. Drawer box corners shall be joined with fluted hardwood dowels and glue spaced at a minimum of 32mm on center. Drawer box fronts shall be removable and attached to drawer box sub-front with screws from inside of drawer.

Horizontal parting rails between drawers shall be 3/4" thick core, with balanced surfaces, secured to and further reinforcing cabinet ends.

K. Doors:

1. Solid Doors shall be: Standard – 3/4 inch thick core.

L. Shelves:

1. Adjustable:
  - a. Adjustable shelves shall be: Standard - Particleboard core, with balanced surfaces.
  - b. Adjustable shelves in closed cabinets shall be: Standard – 3/4" Shelves, 1" for Shelves over 36" wide and open cabinets.
  - c. Adjustable shelf edge on open cabinets shall be: .020" PVC on All Four Edges.
  - d. Adjustable shelf edge on closed cabinets shall be: .020" PVC on All Four Edges.
  - e. Adjustable shelf shall be set back Standard - 15mm from the front.
2. Fixed:
  - a. Fixed shelves shall be: Standard - Particleboard.
  - b. Fixed shelves shall be: 3/4" Shelves, 1" for Shelves Over 36" Wide and Open Cabinets.
  - c. Fixed shelf surfaces on closed cabinets shall be: Standard - Match Interior Selections.
  - d. Fixed shelf surfaces on open cabinets shall be: Standard - Match Interior Selections.

M. Countertops:

1. High-Pressure Decorative Laminate:
  - a. General Purpose. GP-50, high-pressure decorative laminate on horizontal surfaces and edges, conforming to NEMA Standard LD3-1995, unless noted otherwise.
  - b. Laminate bonded to 1-1/8 inch thick M-3 47# particleboard core. Core shall be balanced with HPL backer.
  - c. All joints shall be secured with adhesive and tight joint fasteners.
  - d. Provide back and side splashes as indicated in Drawings. Top edge square.
  - e. Countertop edging for knee-wall and reception counter window shall be solid red oak, finished under Section 099000.
2. Stone Countertops: As specified in Section 12 36 40.

## 2.3 ACCESSORIES

A. Hardware:

1. Hinges:
  - a. Standard - 5-Knuckle Hinges / Reveal Overlay: Hinges shall be: .095" thick steel five-knuckle hospital-tip, institutional Grade (Grade 1 per ANSI/BHMA A156.9) quality with .187" diameter tight pin. Each hinge shall be secured with a minimum of nine No. 8 screws. Hinge shall permit door to swing 270 degrees without binding. Doors less than 48" in height shall have two hinges. Doors over 48" in height shall have three hinges.
2. Pulls:
  - a. One pull shall be located at the centerline of the drawer, regardless of width, to ensure ease of operation and maximize drawer slide life.
    - 1) Standard - Anodized aluminum wire pull, 8mm diameter with 96mm O.C. mounting holes.
3. Drawer Slides:
  - a. Standard - Self-closing, bottom mount epoxy coated with captive roller and positive in stop. Slide shall have 100 lb. load rating, must be: self-closing and must prevent drawer fronts from contacting the cabinet body.
4. Shelf Clips:
  - a. Plastic
    - 1) Standard - Shelf clips shall be injected molded clear plastic, with a double pin engagement 32mm on center and shall have 3/4" and 1" anti-tip locking tabs as

approved in AWI 400B-T-9 for premium Grade. Shelf clips shall be: single pin plastic shelf clip with anti-tip locking tabs, used for all 1/4" hardboard shelves.

5. Catches:
  - a. Roller Catch: heavy-duty, spring-loaded roller, with molded plastic bumper mounted at door top to keep door securely shut.
  - b. Magnetic Catch: white plastic housing with two 32mm spaced, elongated holes for screw-attachment to allow adjustability.
  - c. Catches shall be: Standard - Magnetic at Base and Wall, 1 Roller at Tall.

## 2.4 FINISHES

- A. Plastic Laminate Casework Colors:
  1. Provide High Pressure Laminate in non-premium, non-specialty and manufacturers' standard suede finishes, including:
    - a. Wilsonart® in a "60" or "38" matte finish and Nevamar® in a "T" textured finish and Standard: Formica in a "58" finish and Standard: Pionite in an "N" finish.
  2. Thermally Fused Melamine Laminate.
    - a. Standard - Frosty White (Wilsonart 1573).
  3. Cabinet Liner .020" thick, high-pressure cabinet liner conforming to ANSI/NEMA 3 LD – 2005, Grade CLS. Surface texture shall be similar to exterior finish. Color shall match interior.
    - a. White.
  4. Hinges:
    - a. 5-Knuckle Hinge / Reveal Overlay: Brushed Chrome.
  5. Pulls: Aluminum Wire.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify adequacy of backing and support framing.
- C. Verify location and sizes of utility rough-in associated with work of this section.

### 3.2 INSTALLATION

- A. Set and secure casework and counter tops in place; rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.
- F. Install back and side splashes to wall surface and counter top. Apply bead of sealant to joints and run smooth.

G. Finish transparent wood surfaces under Section 09 90 00.

3.3 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation from Indicated Position: 1/16 inch.
- C. Maximum Offset from Alignment with Abutting Materials: 1/32 inch.

3.4 ADJUSTING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for starting and adjusting.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.5 CLEANING

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for cleaning.
- B. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION**

## **SECTION 21 0001**

### **GENERAL FIRE PROTECTION REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION OF WORK**

- A. This Division includes all labor, materials, equipment, tools, supervision, start-up services, Owner training, etc., including all incidental and related items, necessary to complete installation and successfully test and start up and operate the Fire Protection systems indicated on the drawings, AND as described in each Section of Division 21 0000 Specifications.
- B. All drawings and General Provisions of the Contract, including the General Conditions, Supplementary General Conditions, and Division 1 specification sections, apply to work of all Division 21 sections. The items in this section are not intended to supersede, but are supplementary to, the requirements set forth in other Divisions of the specifications.
- C. The Contractor, and his Subcontractors and Suppliers, shall include in their bid all materials, labor, and equipment involved, in accordance with all local customs, codes, rules, regulations; and secure compliance of all parts of the Specifications and Drawings regardless of Sectional inclusion in these Specifications.
- D. The Contractor shall be held responsible for the complete and satisfactory accomplishment of all Work inclusive of whatever miscellaneous material and/or appurtenances are required to perfect the installation, and demonstrate that all fire protection systems will operate satisfactorily under normal operating conditions.

##### **1.02 DRAWINGS**

- A. The drawings are diagrammatic and show the general location and arrangement of equipment, piping and related items. They shall be followed as closely as elements of the construction will permit. The Contractor shall provide/install all fire protection systems, and associated equipment, complete and include all necessary offsets, fittings, and other components required due to interferences, space constraints, code requirements, etc. as required to provide a complete/functional system.
- B. The general fire protection requirements are intended to augment the drawings and specifications. Should conflicts occur between the drawings and the specifications, the strictest provision shall govern. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect and/or Engineer for resolution.
- C. The Contractor shall examine the drawings of all other trades in order to verify the conditions governing the work on the job site. Arrange work accordingly, providing all piping, fittings, valves and accessories as may be required to meet such conditions.
- D. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect and/or Engineer.
- E. The architectural and structural drawings take precedence in all matters pertaining to the building structure, plumbing drawings in all matters pertaining to plumbing trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect and/or Engineer for resolution.

##### **1.03 COORDINATION OF WORK**

- A. The Contractor and his Subcontractors shall be responsible for all tasks applicable to their work in accordance with the Specifications, Drawings, and code requirements, and shall be responsible for coordinating locations and arrangements of their work to give best results with all

other relevant trades.

1. Coordinate his work to obtain symmetry in ceiling layouts, so that sprinkler heads, lights, diffusers, etc. are coordinated and are installed per the Architectural reflected ceiling plan.
2. Coordinate all wall, roof, floor penetrations, equipment pads, etc. with architectural and structural trades.
3. Refer to architectural floor plans for locations/heights/types of ceilings, structural elements, etc. Coordinate with architectural plans for details on where fire protection piping will be routed, sprinkler head locations, etc.
4. Verify requirements of all equipment with shop drawing submittals prior to installation - notify Architect/Engineer of any conflicts between shop drawings and plans.
5. Coordinate locations of fire protection items that require access (i.e. isolation valves, test valves, etc.) with reflected ceiling plan. Items located above hard non-accessible ceilings shall be provided with access doors as required.
6. Do not route/locate below grade piping below, or with 45 degrees of the bottom corner of, foundation walls/footings. Coordinate with structural trades prior to installing piping.
7. Verify clearance requirements of all mechanical, electrical and plumbing equipment/systems prior to the installation of any new work. Fire protection equipment, piping, systems, etc. shall not interfere with mechanical, electrical, and plumbing equipment spaces.

#### **1.04 INSPECTION OF SITE AND PROJECT DOCUMENTATION**

- A. The Contractor shall visit the site and examine/verify the conditions under which the work must be conducted before submitting proposal. The Contractor shall examine the drawings and specifications of all other trades including Mechanical, Architectural, Structural and Electrical.
- B. The submitting of a proposal implies that the Contractor has visited the site, examined all contract documents, and understands the conditions under which the work must be conducted.
- C. The Contractor shall notify the Architect and/or Engineer, prior to submitting his bid via Request For Information (RFI), of any potential problems that he has identified during his inspection of the site or from the review of plans/specifications. RFIs must be submitted at least 5 working days prior to bid opening.

#### **1.05 GENERAL SUPPORT REQUIREMENTS**

- A. Provide all necessary angle/brackets, hangers, or supplementary supporting steel as required for adequate support for all piping, and equipment. Secure approval from Architect and/or Structural Engineer, in writing, before welding or bolting to steel framing or anchoring to concrete structure, or cutting/coring thru structural systems.
- B. Where piping or equipment is supported or suspended from concrete construction, provide approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.
- C. Install fire protection systems with adequate anchors, guides, expansion loops, etc. as required to provide for piping expansion/contraction.

#### **1.06 GUARANTEE**

- A. Contractor shall guarantee that all labor, materials, and equipment are free from defects and agrees to replace or repair any part of this installation which becomes defective within a period of one year from the date of substantial completion following final acceptance. Acceptance date of substantial completion shall be as determined by the Architect and/or Engineer.
- B. The Contractor shall file with the Owner any and all guarantees from the equipment manufacturers including the operating conditions and performance capacities they are based on.



**1.07 CODES, PERMITS AND FEES**

- A. Refer to Division 1, General Conditions and Supplementary Conditions.
- B. Unless otherwise indicated, all required permits, licenses, inspections, approvals and fees for mechanical work shall be secured and paid for by the Contractor.
- C. All work shall be executed in accordance with the latest enforceable rules and regulations set forth in local and state codes.
  - 1. Fire Protection systems shall be installed per current jurisdictional codes (i.e. International Mechanical Code, International Plumbing Code, etc.), current NFPA codes (i.e. NFPA 13, NFPA 14, NFPA 101, NFPA 90, etc.), and applicable sections of the International Building Code.
- D. In the event that the plans and specifications conflict with any rules, regulations, or codes applying, said rules, regulations and codes shall govern.
- E. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.
- F. Contractor shall prepare any detailed shop drawings and diagrams that are required by the governing authorities (i.e. fire protection plans, fire protection calculations, etc.).

**1.08 UTILITIES**

- A. The Contractor shall be responsible for coordinating, obtaining service, and advising the Engineer, and utility company(s) for the fire protection water service installation.
- B. Rules of local utility companies shall be complied with. The Contractor shall check with the water utility company supplying service to the installation and determine devices including stop valves, etc. which will be required.
- C. In the event that the plans and specifications conflict with any utility rules, regulations, or codes applying, said utility rules, regulations and codes shall govern.

**1.09 SUBSTITUTION ITEMS REQUIRING PRIOR APPROVAL**

- A. All items that the Contractor proposed to use in the work that are not specifically named in the contract documents must be submitted for review. Such items must be submitted in duplicate to the Architect and/or Engineer for approval a minimum of ten (10) days prior to bid opening. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.

**1.10 MATERIAL AND EQUIPMENT MANUFACTURERS**

- A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of plumbing, heating, ventilating and air conditioning equipment and shall be the manufacturer's latest design.
- B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment of product provided shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Substitution Items Requiring Prior Approval specified in this Section of the Specifications. All costs to make these items of equipment comply with these requirements including, but not limited to, piping, sheet metal, electrical work, and building alterations shall be included in the original bid.

- C. All package unit skid mounted equipment that are factory assembled shall meet, in detail, the products named and specified within each section of the detailed mechanical and electrical specifications.

#### **1.11 OPERATION AND MAINTENANCE INSTRUCTIONAL MANUALS**

- A. Provide complete maintenance and operating instructional manuals covering all fire protection equipment as specified herein, Division 1 requirements, and individual equipment specification sections.
- B. The O&M data shall be bound in a suitable number of 3" or 4", 3-ring, hard cover binders. Permanently imprinted on the cover shall be the words, "Manufacturer's Operation and Maintenance Data", project title, location of project, and the date. A table of contents shall be provided in the front of each binder.
- C. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Each piece of equipment in the O&M manual shall be identified as identified on the project drawings (i.e. Backflow Preventers, Air Compressor, etc.).
- D. Internally subdivide the binder contents with permanent page dividers, organized by specification section and/or major equipment/systems (i.e. Fire Protection Riser Equipment, Fire Protection Sprinklers, etc.)
- E. Contents: Each volume of O&M manual shall have three parts:
  - 1. Part 1: A directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: O&M data, arranged and subdivided by major equipment/systems. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers:
    - a. List of equipment.
    - b. Copies of Shop drawings and product data, approved by Architect/Engineer.
    - c. Installation and operational procedures.
    - d. Routine maintenance procedures.
    - e. Trouble shooting procedures.
    - f. Complete parts lists by nomenclature, manufacturer's part number and use.
    - g. Recommended spare parts lists.
    - h. Complete wiring and schematic diagrams.
    - i. Elevations and/or sections cut through all of the major equipment and sub-assemblies.
  - 3. Part 3: Project documents and certificates, including the following: Shop drawings.
    - a. Warranty Certificates.
    - b. Contractor's and equipment manufacturer's telephone numbers for warranty repair services.
    - c. Copies of approved construction permits.
- F. Maintenance and Operating manuals shall be provided to the Architect and/or Engineer for review when construction is 75% complete.
- G. A minimum of two (2) copies of all approved Operation and Maintenance literature shall be furnished to the Owner within 10 days after final inspection. O&M manuals must be completed prior to start of Owner training as the manuals shall be used as the basis of the training.

#### **1.12 SHOP DRAWINGS/SUBMITTALS**

- A. Refer to General Conditions and Supplementary General Conditions.
- B. All shop drawings shall be submitted in groupings of similar and/or related items. Incomplete submittal groupings will be returned unchecked.
- C. Submit fire protection system shop drawings, product data and hydraulic calculations to local Authorities Having Jurisdiction, the Owner's insuring agency, and the Architect and/or Engineer for approval prior to fabrication or installation. Submit proof of approval from the Authority Having Jurisdiction to Architect and/or Engineer.
- D. Unless noted otherwise, submit digital (.pdf format) copies of complete manufacturer's shop drawings for all equipment, valves, specialties, pipe hangers, wiring diagrams and control diagrams including, but not limited to the items listed below. Where items are referred to by symbolic designation on the drawings and specifications, all submittals shall bear the same designation. Refer to other Sections of the fire protection specifications for additional requirements.
  - 1. 21 2201 Clean-Agent Fire Extinguishing System.
    - a. Fire Protection Sprinklers.
    - b. Fire Protection Piping Layouts.
    - c. Fire Protection Calculations

#### **1.13 INSTRUCTION OF OWNER PERSONNEL**

- A. Before final inspection the Contractor shall instruct Owner's designated personnel in operation, adjustment and maintenance of mechanical equipment and systems at agreed upon times. A minimum of 8 hours of formal instruction to Owner's personnel shall be provided for each building. Additional hours are specified in individual specifications sections.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use Operation and Maintenance Manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

#### **1.14 RECORD DRAWINGS**

- A. Contractor shall submit to the Architect and/or Engineer, record drawings which have been neatly marked to represent as-built conditions for all new fire protection work.
- B. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the underground concealed conditions and other items of construction on field drawings as they occur. The marked up field documents shall be available for review by the Architect and/or Engineer, and Owner at their request.

#### **1.15 HAZARDOUS CONDITIONS**

- A. Prior to starting work in any hazardous condition area, obtain approval for doing so from a qualified representative of the Owner who is designated and authorized by the Owner to perform testing and abatement, if necessary, of all hazardous materials including, but not limited to, asbestos, PCB, etc.. The Contractor shall visit the site prior to construction and indicate to the Owner's representative the areas that may need testing and abatement (i.e. existing pipes that need renovating, boilers that need removal, etc.). The Contractor shall not perform any inspection, testing, containment, removal or other work that is related in any way whatsoever to hazardous materials under the contract.

### **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 INSTALLATION OF EQUIPMENT**

- A. Install equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect and/or Engineer for resolution.

### **3.03 WORK IN EXISTING BUILDINGS**

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed work. Promptly repair any damage to same at Contractor's expense.
- C. Consult with the Architect and/or Engineer as to the methods of carrying on the work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Architect and/or Owner's Representative.

### **3.04 WORK INVOLVING OTHER TRADES**

- A. Certain items of equipment or materials specified in the Fire Protection Division may have to be installed by other trades due to code requirements or union jurisdictional requirements. In such instances, the Contractor shall complete the work through an approved, qualified subcontractor and shall include the full cost for same in his bid.

### **3.05 COORDINATION**

- A. Install work to avoid interference with work of other trades including, but not limited to, architectural and electrical trades. Remove and relocate any work that causes an interference at Contractor's expense. Disputes regarding the cause of an interference shall be resolved by the Architect and/or Engineer.

### **3.06 CHASE, SHAFTS AND RECESSES**

- A. Coordinate with structural, architectural and other trades to ensure accurate location and size of chases, shafts and recesses required for fire protection systems/piping.

### **3.07 SLEEVES**

- A. Provide and install Schedule 40 black steel pipe sleeves, cut to length, wherever pipes pass through above grade walls and floors. Provide and install galvanized steel pipe sleeves, cut to length, wherever pipes pass through below grade foundation walls and slab on grade floors. Sleeves shall terminate flush with walls in finished areas. All sleeves through the floor are to extend two (2) inches above finish floor.
- B. Provide escutcheons at each penetration through walls, floors, and ceilings in exposed areas.
- C. Patch sleeves to match building material.

### **3.08 SEALING OF FIRE PROTECTION OPENINGS**

- A. Seal the space around pipes and sleeves through walls, floors and ceilings.
- B. Provide adequate clearance to allow for proper pipe movement and sealing.
- C. Provide/install fireproof wall and floor sleeves as required by applicable building codes at all applicable wall, ceiling, and floor penetrations. Refer to Architectural plans for wall assembly ratings.

- D. Sleeves placed in floors shall be flush with the underside of the floor construction and shall have planed, square ends, extending 2 inches above the finished floor, unless otherwise noted or detailed.
- E. Where sleeves pass through reinforced concrete floors, they shall be properly set in position prior to concrete pouring in such a way that they will be maintained in position until the concrete is set.
- F. Pipes passing through below grade perimeter walls or slabs on grade shall have the space between the pipe and sleeve sealed watertight with a mechanically expandable elastomer seal device.
- G. Penetrations through fire rated floors and walls shall be firestopped per applicable building code requirements with UL and FMRC approved materials and shall have a fire rating equal to or greater than the fire partition rating. Refer to architectural plans for locations and assembly ratings.
  - 1. Packing: Refractory fiber or ceramic fiber.
    - a. Manufacturers:
      - 1) Carborundum Fiberfrax.
      - 2) Johns-Manville - Cerafelt.
      - 3) Eagle Picher Epitherm 1200.
      - 4) Babcock and Wilcox Kaowool.
  - 2. Fire stop sealant.
    - a. Manufacturers:
      - 1) Hilti
      - 2) Tremco
      - 3) Mameco
      - 4) Pecora
  - 3. For polypropylene (Acid Waste/Acid Vent piping) penetrations through fire rated assemblies, provide an intumescent firestop.
    - a. Hilti CP 642 Firestop Collar.
    - b. Hilti FS-ONE High Performance Intumescent Firestop Sealant.
    - c. 3M Fire Barrier PPD Plastic Pipe Device.
    - d. 3M Fire Barrier Intumescent Firestop Sealant.
  - 4. Where combustible pipes, tubes, vents, etc. penetrate a fire rated assembly, such penetrations shall be protected by an approved through-penetration fire stop collar/sealant system per the building code.
    - a. Through -penetration firestop systems shall be tested in accordance with ASTM E814 with a minimum positive pressure differential of 0.01 inch WG. Through penetration firestop systems shall have a "F" rating and a "T" rating of not less than 1 hour but not less than the required rating of the assembly penetrated.
    - b. Hilti CP 642 Firestop Collar.
    - c. Hilti FS-ONE High Performance Intumescent Firestop Sealant.
    - d. 3M Fire Barrier PPD Plastic Pipe Device.
    - e. 3M Fire Barrier Intumescent Firestop Sealant.

**3.09 CUTTING, CORING AND PATCHING**

- A. Refer to General Conditions
- B. The Contractor shall perform all cutting, coring, and patching that may be necessary for the installation of their Work. All cutting, coring, patching and repair work shall be performed by the Contractor through qualified Subcontractors. Contractor shall include full cost of same in his bid.
- C. Secure approval from Architect and/or Structural Engineer, in writing, before cutting, welding/bolting to, or anchoring from any structural building components (i.e. structural steel, load bearing walls, footings/foundations, concrete floors/ceilings, etc.).

**3.10 EQUIPMENT FOUNDATIONS AND SUPPORTS**

- A. Shall be as required or as shown on plans or specified.
- B. Provide concrete housekeeping pads for all floor mounted fire protection equipment (i.e. backflow preventers, air compressor, pumps, valves, etc.). Concrete housekeeping pads shall be installed by qualified concrete trade subcontractors. Concrete housekeeping pads shall be poured before equipment is installed, minimum 4" tall, with anchor bolts and sleeves to fit machine base. Contractor shall include full cost of concrete housekeeping pads in his bid.
- C. Coordinate concrete housekeeping pads to insure correct size, location, anchor bolts and sleeves.
- D. For equipment suspended from ceiling or walls, furnish and install all inserts, rods, structural steel frames, brackets and platforms required. Obtain approval of Architect and/or Engineer for same including loads, locations, and methods of attachment.

**3.11 EQUIPMENT CONNECTIONS**

- A. Make connections to equipment, pumps, and other items included in the work in accordance with the approved shop drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished.
- B. All piping connections to equipment shall be flanged or shall be made with unions to facilitate equipment removal.
- C. All piping connections to pumps other equipment shall be installed without strain at the pipe connection of this equipment.
- D. Brass unions for connections of 2 inch and less and flanged union with dielectric gasket and bolt sleeves for 2-1/2 inch and greater shall be used for equipment connections of dissimilar metals.

**3.12 ACCESSIBILITY**

- A. All equipment shall be installed so as to be readily accessible for operation, maintenance, and repair, as required by the equipment manufacturer and as subject to the approval of the Engineer.

**3.13 CLEANING**

- A. Each trade shall be responsible for removing all debris daily as required to maintain the work area in a neat, orderly condition.
- B. After equipment and systems have been completed and tested, each entire system shall be cleaned and flushed.
- C. Prior to connection of new piping to existing piping systems, all new piping shall be subject to initial flushing, cleaning and final flushing. Provide temporary bypass piping and fittings, temporary valves and strainers, temporary water make-up piping with approved means of backflow prevention, and temporary pumps as needed to perform specified flushing and cleaning



requirements.

### **3.14 PAINTING**

- A. All fire protection systems, equipment, piping, etc. exposed in finished areas shall be painted to match the surrounding finishes. Refer to specification section 09900 - Coordinate color with Architect.

### **3.15 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS**

- A. Electrical equipment furnished by Fire Protection Trades and installed by Electrical Trades shall be turned over to Electrical Trades in good condition.
- B. Equipment and materials shall be protected from theft, injury or damage.
- C. Coat polished or plated metal parts with white petroleum jelly immediately after installation.
- D. Protect equipment outlets, pipe openings with temporary plugs or caps.
- E. Provide adequate storage for all equipment and materials delivered to the job site. Equipment set in place in unprotected areas must be provided with temporary protection.

### **3.16 GENERAL SUPPORT REQUIREMENTS**

- A. Each trade shall provide all required supporting components to properly support their work. Supporting components/systems shall be in accordance with Code and as specified.
- B. Provide all necessary angle/brackets or supplementary steel as required for adequate support for all piping, valves, specialties, and equipment. Secure approval from Architect and/or Structural Engineer, in writing, before welding or bolting to steel framing or anchoring to concrete structure.
- C. Where piping, specialties, or equipment is supported or suspended from concrete construction, provide approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.

### **3.17 DRAWINGS AND MEASUREMENTS**

- A. These specifications and accompanying drawings are intended to describe and provide for finished work. They are intended to be cooperative, and what is called for by either the drawings or specifications shall be as binding as if call for by both. The work herein described shall be complete in every detail.
- B. The Drawings are not intended to be scaled for rough-in measurements, nor to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement shall be taken by the Contractor. The Contractor shall check latest architectural drawings to locate equipment/fixtures/etc., check latest structural drawings for interferences, etc..

### **3.18 EXTRA WORK**

- A. For any extra work which may be proposed, the Contractor shall furnish to the General Contractor/Construction Manager, an itemized breakdown of the estimated cost of all materials and labor required to complete this work. The estimate cost breakdown shall include unit prices (same prices for increase/decrease of work) for all materials (i.e. duct, piping, valves, equipment, equipment rental, etc.) and all labor (i.e. manhours, overtime, etc.) which may be required for any proposed extra work. The Contractor shall not proceed until receiving a written order from the General Contractor establishing the agreed price and describing the work to be done.

## **END OF SECTION**

## **SECTION 21 0553**

### **IDENTIFICATION FOR FIRE SUPPRESSION PIPING AND EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe Markers.

##### **1.02 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
- B. Champion America, Inc.: [www.Champion-America.com](http://www.Champion-America.com).
- C. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).

##### **2.02 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: White.
  - 2. Letter Height: 1/4 inch.
  - 3. Background Color: Black.

##### **2.03 TAGS**

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- C. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

##### **2.04 PIPE MARKERS**

- A. Color: Conform to ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

#### **PART 3 EXECUTION**

##### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

**3.02 INSTALLATION**

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Identify control panels and major control components outside panels with plastic nameplates.
- F. Identify valves in main and branch piping with tags.
- G. Tag automatic controls, instruments, and relays. Key to control schematic.
- H. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and pressure. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.

**END OF SECTION**

## **SECTION 21 2201**

### **CLEAN AGENT FIRE SUPPRESSION SYSTEM**

#### **PART 1 – GENERAL**

##### **1.01 DESCRIPTION OF WORK:**

- A. This specification outlines the requirements for a "Total Flood" Clean Agent Fire Suppression System with automatic detection and control. The work described in this specification includes all engineering, labor, materials, equipment and service necessary, and required, to complete and test the suppression system.

##### **1.02 APPLICABLE STANDARDS AND PUBLICATIONS:**

- A. The design, equipment, installation, testing and maintenance of the Clean Agent Suppression System shall be in accordance with the applicable requirements set forth in the latest edition of the following codes and standards:
  - 1. National Fire Protection Association (NFPA) Standards:
    - NFPA 2001 Clean Agent Fire Extinguishing Systems
    - NFPA 70 National Electric Code
    - NFPA 72 National Fire Alarm Code
  - 2. Factory Mutual Systems (FM) Publications
    - Factory Mutual Approval Guide
  - 3. Underwriters Laboratories, Inc. (UL) Publication
    - Fire Protection Equipment Directory with quarterly supplements
  - 4. National Electrical Manufacturers Association (NEMA) Publication
    - Enclosures for Industrial Controls and Systems
  - 5. U.S. Environmental Protection Agency, Protection of Stratospheric Ozone 59 FR 13044 (SNAP)
  - 6. Requirements of the Authority Having Jurisdiction (AHJ), State and Local codes in force at time of award of contract
- B. The standards listed, as well as all other applicable codes, standards, and good engineering practices, shall be used as "minimum" design standards.

##### **1.03 REQUIREMENTS:**

- A. The Suppression System installation shall be made in accordance with the drawings, specifications, and applicable standards. Should a conflict occur between the drawings and specifications, the specifications shall prevail.

##### **1.04 EXCLUSIONS:**

- A. The work listed below shall be provided by others, or under other sections of this specification:
  - 1. 120 VAC or 220 VAC power supply to the system control panel.
  - 2. Interlock wiring and conduit for shutdown of HVAC, dampers and/or electric power supplies, relays or shunt trip breakers and interface with the building fire alarm system.

##### **1.05 QUALITY ASSURANCE:**

- A. MANUFACTURER:
  - 1. The manufacturer of the suppression system hardware and detection components shall be ISO 9001 registered.
  - 2. The name of the manufacturer shall appear on all major components.

3. All devices, components, and equipment shall be the products of the same manufacturer, or supplied by the same manufacturer.
4. All devices, components, and equipment shall be new, standard products of the manufacturer's latest design and suitable to perform the functions intended.
5. All devices and equipment shall be UL listed and/or FM approved.
6. Locks for all cabinets shall be keyed alike.

**B. INSTALLER:**

1. The installing contractor shall be trained by the supplier to design, install, test, and maintain fire suppression systems.
2. When possible, the installing contractor shall employ a NICET certified special hazard designer, Level II or above, who will be responsible for this project.
3. The installing contractor shall be an experienced firm regularly engaged in the installation of automatic clean agent, or similar, fire suppression systems, in strict accordance with all applicable codes and standards.
4. The installing contractor must have a minimum of 5 years experience in the design, installation, and testing, of clean agent, or similar fire suppression systems. A list of systems of a similar nature and scope shall be provided on request.
5. The installing contractor shall show evidence that his company carries a minimum \$2 million liability and completed operations insurance policy. These limits shall supersede limits required in the general conditions of the specifications.
6. The installing contractor shall maintain, or have access to, a clean agent recharging station. The installing contractor shall provide proof of his ability to recharge the largest clean agent system within 24 hours after a discharge. Include the amount of bulk agent storage available.
7. The installing contractor shall be an authorized stocking distributor of the clean agent system equipment so that immediate replacement parts are available from inventory.
8. The installing contractor shall show proof of emergency service available 24 hours a day, 7 days a week.

**C. SUBMITTALS:**

1. The installing contractor shall submit the following design information and drawings for approval prior to starting work on this project:
  - a. Field installation layout drawings having a scale of not less than 1/8 in. (3.2 mm) = 1 ft.- 0 in. (0.3 m) or 1:100 detailing the location of all agent storage tanks, nozzles, pipe runs, including pipe sizes and lengths, control panel(s), detectors, manual pull stations, abort stations, audible and visual alarms, etc.
  - b. Auxiliary details and information such as maintenance panels, door holders, special sealing requirements, and equipment shutdown.
  - c. Separate layouts, or drawings, shall be provided for each level, (i.e.; room, sub floor, and above ceiling) and for mechanical and electrical work.
  - d. Electrical layout drawings shall show the location of all devices and include point-to-point conduit runs and a description of the method(s) used for detector mounting.
  - e. Provide an internal control panel wiring diagram which shall include power supply requirements and field wiring termination points.
  - f. Separate drawing providing symbol legend and identifying all symbols used.

- g. Annunciator wiring schematics and dimensioned display panel illustration shall be provided. (Optional device).
  - h. Complete hydraulic flow calculations, from a UL listed computer program, shall be provided for all engineered clean agent systems. Calculation sheet(s) must include the manufacturer's name and UL listing number for verification. The individual sections of pipe and each fitting to be used, as shown on the isometrics, must be identified and included in the calculation. Total agent discharge time must be shown and detailed by zone.
  - i. Provide calculations for the battery stand-by power supply, taking into consideration the power requirements of all alarms, initiating devices, and auxiliary components under full load conditions.
  - j. A complete sequence of operation shall be submitted detailing all alarm devices, shutdown functions, remote signaling, damper operation, time delay, and agent discharge for each zone or system.
2. Submit drawings, calculations and system component sheets for approval to the local fire prevention agency, owner's insurance underwriter, and all other authorities having jurisdiction before starting installation. Submit approved plans to the architect/engineer for record.

## **PART 2 – SYSTEM REQUIREMENTS**

### **2.01 SYSTEM DESCRIPTION AND OPERATION:**

- A. The system shall be a Total Flood SAPPHIRE Fire Suppression System supplied by Ansul Incorporated (hereinafter referred to as "Ansul").
- B. The system shall provide a Novec 1230 minimum design concentration of 4.5% by volume for Class A hazards and a minimum of 5.85% by volume for Class B hazards in all areas and/or protected spaces, at the minimum anticipated temperature within the protected area. System design shall not exceed 10% for normally occupied spaces, adjusted for maximum space temperature anticipated, with provisions for room evacuation before agent release.
- C. The system shall be complete in all ways. It shall include a mechanical and electrical installation, all detection and control equipment, agent storage containers, Novec 1230 agent, discharge nozzles, pipe and fittings, manual release and abort stations, audible and visual alarm devices, auxiliary devices and controls, shutdowns, alarm interface, advisory signs, functional checkout and testing, training and any other operations necessary for a functional UL listed SAPPHIRE Clean Agent suppression system.
- D. Provide 2 inspections during the first year of service: Inspections shall be made at 6-month intervals commencing when the system is first placed into normal service.
- E. The general contractor shall be responsible for sealing and securing the protected spaces against agent loss and/or leakage during the "hold" period, which is a minimum period of 10 minutes or a time period sufficient to allow for response by trained personnel.
- F. The system(s) shall be actuated by a combination of ionization and photoelectric detectors installed for maximum area coverage of 250 ft<sup>2</sup> (23.2 m<sup>2</sup>) per detector, in the room. If the airflow is one air change per minute, photoelectric detectors only shall be installed for maximum area coverage of 125 ft<sup>2</sup> (11.6 m<sup>2</sup>) per detector. (Ref. NFPA No. 72).
- G. Detectors shall be Cross-Zoned detection requiring 2 detectors to be in alarm before release.
- H. Automatic operation of each protected area shall be as follows:
  - 1. Actuation of 1 detector, within the system, shall:
    - a. Illuminate the "ALARM" lamp on the control panel face.
    - b. Energize an alarm bell.



- c. Transfer auxiliary contacts, which can perform auxiliary system functions such as: Operate door holder/closures on access doors; Transmit a signal to a fire alarm system; Shutdown HVAC equipment.
  - d. Light an individual lamp on an optional annunciator.
- 2. Actuation of a 2nd detector, within the system, shall:
  - a. Illuminate the "PRE-DISCHARGE" lamp on the control panel face.
  - b. Energize a pre-discharge horn/strobe device.
  - c. Shut down the HVAC system and/or close dampers.
  - d. Start time-delay sequence (not to exceed 60 seconds).
  - e. System abort sequence is enabled at this time.
  - f. Light an individual lamp on an optional annunciator.
- 3. After completion of the time-delay sequence, the SAPPHIRE Clean Agent system shall discharge and the following shall occur:
  - a. Illuminate a "SYSTEM FIRED" lamp on the control panel face.
  - b. Shutdown of all power to high-voltage equipment.
  - c. Energize a visual indicator(s) outside the hazard in which the discharge occurred.
  - d. Energize a "System Fired" audible device. (Optional)
- 4. The system shall be capable of being actuated by manual discharge devices located at each hazard exit. Operation of a manual device shall duplicate the sequence description above except that the time delay and abort functions shall be bypassed. The manual discharge station shall be of the electrical actuation type and shall be supervised at the main control panel.

## **2.02 MATERIAL AND EQUIPMENT:**

### **A. GENERAL REQUIREMENTS:**

- 1. The SAPPHIRE Clean Agent system materials and equipment shall be standard products of the supplier's latest design and suitable to perform all functions intended. When one or more pieces of equipment must perform the same function(s), they shall be duplicates produced by one manufacturer.
- 2. All devices and equipment shall be U.L. Listed and/or FM approved.
- 3. Each system shall have its own supply of clean agent.
- 4. The system design can be modular, central storage, or a combination of both design criteria.
- 5. Systems shall be designed in accordance with the manufacturer's guidelines.
- 6. Each supply shall be located within the hazard area, or as near as possible, to reduce the amount of pipe and fittings required to install the system.
- 7. The clean agent shall be stored in SAPPHIRE Clean Agent storage tanks. Tanks shall be super-pressurized with dry nitrogen to an operating pressure of 360 psi at 70 °F (24.8 bar at 21 °C). Tanks shall be of high-strength low alloy steel construction and conforming to NFPA 2001.
- 8. Tanks (master) shall be actuated by either a resettable electric actuator or by pneumatic means from a nitrogen cartridge located in the releasing device. Explosive devices shall not be permitted.
- 9. Each tank shall have a pressure gauge and low pressure switch (optional) to provide visual and electrical supervision of the container pressure. The low-pressure switch shall be wired to the control panel to provide audible and visual "Trouble" alarms in the event the container pressure drops below 290 psi (20.0

bar). The pressure gauge shall be color coded to provide an easy, visual indication of container pressure.

10. Tanks shall have a pressure relief provision that automatically operates before the internal nominal pressure exceeds 730 psi (50.3 bar).
11. Engineered discharge nozzles shall be provided within the manufacturer's guidelines to distribute the Novec 1230 agent throughout the protected spaces. The nozzles shall be designed to provide proper agent quantity and distribution. Nozzles shall be available in 1/2 in. through 2 in. pipe sizes. Each size shall be available in 180° and 360° distribution patterns.
12. Distribution piping and fittings shall be installed in accordance with the manufacturer's requirements, NFPA 2001, and approved piping standards and guidelines. All distribution piping shall be installed by qualified individuals using accepted practices and quality procedures. All piping shall be adequately supported and anchored at all directional changes and nozzle locations:
  - a. All piping shall be reamed, blown clear and swabbed with suitable solvents to remove burrs, mill varnish and cutting oils before assembly.
  - b. All pipe threads shall be sealed with Teflon tape pipe sealant applied to the male thread only.

B. AGENT:

1. The fire suppression agent shall be 3M™ Novec™ 1230 Fire Protection Fluid manufactured by 3M Company, St. Paul, MN or their approved supplier.
2. Agent shall not contain any Hydrofluorocarbons (HFC).

C. CONTROL PANEL:

1. The control panel shall be an ANSUL® AUTOPULSE Z-10 releasing panel supplied by Ansul Incorporated.
2. The detection control system and its components shall be UL listed and FM approved for use as a local fire alarm system with releasing device service.
3. The control system shall perform all functions necessary to operate the system detection, actuation, and auxiliary functions.
4. The control system shall include battery standby power to support 24 hours in standby and 5 minutes in alarm.
5. The control system shall be microprocessor based, utilizing a distributed processing concept. A single microprocessor failure shall not impact operation of additional modules in the system.
6. The control system shall be capable of supporting Cross Zoned Detection.
7. The control system shall supply integrated 2.0 amp (minimum) power supply circuitry.
8. Each control system shall contain 4 initiating circuits:
  - a. Each circuit shall be capable of Class A (Style D) or Class B (Style A) operation.
  - b. Each circuit shall be capable of operating up to 15 approved detectors or 30 detectors per system.
  - c. Each circuit shall be capable of monitoring contact devices configured for manual release, manual alarm, system abort, trouble input or auxiliary (non-fire) input.
9. Each control system shall contain release circuits for activation of a fire suppression system(s):
  - a. Each circuit shall be capable of Class B (Style Y) operation.
  - b. Each circuit shall be rated for a minimum of 1.5 amp @ 24 VDC.
10. Each control system shall contain 2 indicating appliance circuits for annunciation:
  - a. Each circuit shall be capable of Class A (Style B) or Class B (Style Y) operation.

- b. Each circuit shall be rated for a minimum of 1.5 amp @ 24 VDC.
- 11. Each control system shall provide an auxiliary power supply rated for 2 amps @ 24 VDC.
- 12. Each control system shall provide 2 SPST relays: one for common alarm and one for common trouble. Four additional programmable relays can be added to each control system by adding a relay module.

D. DETECTORS:

- 1. The detectors shall be spaced and installed in accordance with the manufacturer's specifications and the guidelines of NFPA 72.
- 2. The photoelectric detector shall be an ANSUL AUTOPULSE model.

E. MANUAL RELEASE (ELECTRIC):

- 1. The electric manual release shall be a dual action device which provides a means of manually discharging the suppression system when used in conjunction with the detection system.
- 2. The manual release shall be an ANSUL model.
- 3. The manual release or manual pull station shall be a dual action device requiring 2 distinct operations to initiate a system actuation.
- 4. Manual actuation shall bypass the time delay and abort functions and shall cause all release and shutdown devices to operate in the same manner as if the system had operated automatically.
- 5. Manual release shall be located at each exit from the protected hazard.

F. ABORT STATION (OPTIONAL):

- 1. The optional abort station shall be the "Dead Man" type and shall be located next to each manual release.
- 2. The abort station shall be an ANSUL model.
- 3. The abort station shall be supervised and shall indicate a trouble condition at the control panel, if depressed, and no alarm condition exists.
- 4. "Locking" or "Keyed" abort stations shall not be permitted.

G. AUDIBLE AND VISUAL ALARMS:

- 1. Alarm audible and visual signal devices shall operate from the control panel.
- 2. The alarm bell, alarm horn, and horn strobe devices shall be an ANSUL AUTOPULSE model.
- 3. The visual alarm unit shall be an ANSUL AUTOPULSE strobe device.
- 4. A strobe device shall be placed outside, and above, each exit door from the protected space. Provide an advisory sign at each light location.

H. CAUTION AND ADVISORY SIGNS:

Signs shall be provided to comply with NFPA 2001 and the recommendations of the SAPPHIRE equipment provider.

- 1. Entrance sign: 1 required at each entrance to a protected space.
- 2. Manual discharge sign: 1 required at each manual release station.
- 3. Flashing light sign: 1 required at each flashing light over each exit from a protected space.

I. SYSTEM AND CONTROL WIRING:

- 1. All system wiring shall be furnished and installed by the contractor.

2. All wiring shall be installed in electrical metallic tubing (EMT), or conduit, and must be installed and kept separate from all other building wiring.
3. All system components shall be securely supported independent of the wiring. Runs of conduit and wiring shall be straight, neatly arranged, properly supported, and installed parallel and perpendicular to walls and partitions.
4. The sizes of the conductors shall be those specified by the manufacturer. Color-coded wire shall be used. All wires shall be tagged at all junction points and shall be free from shorts, earth connections (unless so noted on the system drawings), and crosses between conductors. Final terminations between the control panel and the system field wiring shall be made under the direct supervision of a factory-trained representative.
5. All wiring shall be installed by qualified individuals, in a neat and workmanlike manner, to conform to the National Electrical Code, Article 725 and Article 760, except as otherwise permitted for limited energy circuits, as described in NFPA 72. Wiring installation shall meet all local, state, province, and/or country codes.
6. The complete system electrical installation and all auxiliary components shall be connected to earth ground in accordance with the National Electrical Code.

### **PART 3 – TESTING AND DOCUMENTATION**

#### **3.01 SYSTEM INSPECTION AND CHECKOUT:**

- A. After the system installation has been completed, the entire system shall be checked out, inspected, and functionally tested by qualified, trained personnel, in accordance with the manufacturer's recommended procedures and NFPA standards:
  1. All containers and distribution piping shall be checked for proper mounting and installation.
  2. All electrical wiring shall be tested for proper connection, continuity and resistance to earth.
  3. The complete system shall be functionally tested, in the presence of the owner or his representative, and all functions, including system and equipment interlocks, must be operational at least 5 days prior to the final acceptance tests.
  4. Each detector shall be tested in accordance with the manufacturer's recommended procedures and test values recorded.
  5. All system and equipment interlocks, such as door release devices, audible and visual devices, equipment shutdowns, local and remote alarms, etc. shall function as required and designed.
  6. Each control panel circuit shall be tested for trouble by inducing a trouble condition into the system.

#### **3.02 TRAINING REQUIREMENTS:**

- A. Prior to final acceptance, the installing contractor shall provide operational training to the owner's personnel. The training session shall include control panel operation, manual and (optional) abort functions, trouble procedures, supervisory procedures, auxiliary functions and emergency procedures.

#### **3.03 OPERATION and MAINTENANCE:**

- A. Prior to final acceptance, the installing contractor shall provide three complete operation and maintenance instruction manuals to the owner. All aspects of system operation and maintenance shall be detailed, including piping isometrics, wiring diagrams of all circuits, a written description of the system design, sequence of operation and drawing(s) illustrating control logic and equipment used in the system. Checklists and procedures for

emergency situations, troubleshooting techniques, maintenance operations and procedures shall be included in the manual.

### **3.04 AS-BUILT DRAWINGS:**

- A. Upon completion of each system, the installing contractor shall provide three copies of system "AS-Built" drawings to the owner. The drawings shall show actual installation details including all equipment locations (ie., control panel(s), agent container(s), detectors, alarms, manual pull station(s) and abort switch(s), etc.), as well as piping and conduit routing details. Show all room or facilities modifications, including door and/or damper installations completed. One copy of reproducible engineering drawings shall be provided reflecting all actual installation details.

### **3.05 ACCEPTANCE TEST:**

- A. At the time "AS-Built" drawings and maintenance/operations manuals are submitted, the installing contractor shall submit a "Test Plan" describing procedures to be used to test the control system(s). The Test Plan shall include a step-by-step description of all tests to be performed and shall indicate the type and location of test apparatus to be employed. The tests shall demonstrate that the operational and installation requirements of this specification have been met. All tests shall be conducted in the presence of the owner and shall not be conducted until the Test Plan has been approved.
- B. The tests shall demonstrate that the entire control system functions as designed and intended. All circuits shall be tested: automatic actuation and manual actuation, HVAC and power shutdowns, audible and visual alarm devices, and manual override of abort functions. Supervision of all panel circuits, including AC power and battery power supplies, shall be tested and qualified.
- C. A room pressurization test shall be conducted in each protected space to determine the presence of openings, which would affect the agent concentration levels. The test(s) shall be conducted using the Retro-Tec Corp. Door Fan system, or equivalent, with integrated computer program. All testing shall be in accordance with NFPA 2001.
- D. If room pressurization testing indicates that openings exist which would result in leaks and/or loss of the extinguishing agent, the installing contractor shall be responsible for coordinating the proper sealing of the protected space(s) by the general contractor or his sub-contractor or agent. The general contractor shall be responsible for adequately sealing all protected space(s) against agent loss or leakage. The installing contractor shall inspect all work to ascertain that the protected space(s) have been adequately and properly sealed. THE SUPPRESSION SYSTEM INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUCCESS OF THE ROOM PRESSURIZATION TESTS. If the first room pressurization test is not successful, in accordance with these specifications, the installing contractor shall direct the general contractor to determine, and correct, the cause of the test failure. The installing contractor shall conduct additional room pressurization tests, at no additional cost to the owner, until a successful test is obtained. Copies of successful test results shall be submitted to the owner for his record. Upon acceptance by the owner, the completed system(s) shall be placed into service.

### **3.06 SYSTEM INSPECTIONS:**

- A. During the 1-year warranty period, the installing contractor shall offer to provide 2 inspections of each system installed under this contract. The first inspection shall be at the 6-month interval, and the second inspection at the 12-month interval. Inspections shall be conducted in accordance with the manufacturer's guidelines and the recommendations of NFPA 2001.
- B. Documents certifying satisfactory system(s) inspection shall be submitted to the owner upon completion of each inspection.

**3.07 WARRANTY:**

- A. All ANSUL system components furnished and installed under this contract shall be warranted against defects in design, materials and workmanship for the full warranty period which is standard with the manufacturer, but in no case less than one (1) year from the date of system acceptance.

**END OF SECTION**



## **SECTION 22 0001**

### **GENERAL PLUMBING REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION OF WORK**

- A. This Division includes all labor, materials, equipment, tools, supervision, start-up services, Owner training, etc., including all incidental and related items, necessary to complete installation and successfully test and start up and operate the Plumbing systems indicated on the drawings, AND as described in each Section of Division 220000 Specifications, AND applicable Division 210000 Specifications.
- B. All drawings and General Provisions of the Contract, including the General Conditions, Supplementary General Conditions, and Division 1 specification sections, apply to work of all Division 22 sections. The items in this section are not intended to supersede, but are supplementary to, the requirements set forth in other Divisions of the specifications.
- C. The Contractor, and his Subcontractors and Suppliers, shall include in their bid all materials, labor, and equipment involved, in accordance with all local customs, codes, rules, regulations; and secure compliance of all parts of the Specifications and Drawings regardless of Sectional inclusion in these Specifications.
- D. The Contractor shall be responsible for the complete and satisfactory accomplishment of all Work inclusive of whatever miscellaneous material and/or appurtenances are required to perfect the installation, and demonstrate that all plumbing systems will operate satisfactorily under normal operating conditions.

##### **1.02 DRAWINGS**

- A. The drawings are diagrammatic and show the general location and arrangement of equipment, piping and related items. They shall be followed as closely as elements of the construction will permit. The Contractor shall provide/install all plumbing systems, and associated equipment, complete and include all necessary offsets, fittings, and other components required due to interferences, space constraints, code requirements, etc. as required to provide a complete/functional system.
- B. The general plumbing requirements are intended to augment the drawings and specifications. Should conflicts occur between the drawings and the specifications, the strictest provision shall govern. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the ARCHITECT and/or ENGINEER for resolution.
- C. The Contractor shall examine the drawings of all other trades in order to verify the conditions governing the work on the job site. Arrange work accordingly, providing all piping, fittings, traps, valves and accessories as may be required to meet such conditions.
- D. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the ARCHITECT and/or ENGINEER.
- E. The architectural and structural drawings take precedence in all matters pertaining to the building structure, plumbing drawings in all matters pertaining to plumbing trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the ARCHITECT and/or ENGINEER for resolution.

##### **1.03 COORDINATION OF WORK**

- A. The Contractor and his Subcontractors shall be responsible for all tasks applicable to their work in accordance with the Specifications, Drawings, and code requirements, and shall be

responsible for coordinating locations and arrangements of their work to give best results with all other relevant trades.

1. Coordinate his work to obtain symmetry in ceiling layouts, so that sprinkler heads, lights, diffusers, etc. are coordinated and are installed per the Architectural reflected ceiling plan.
2. Coordinate all wall, roof, floor penetrations, equipment pads, etc. with architectural and structural trades.
3. Refer to architectural floor plans for exact locations/heights of fixtures (standard and barrier free), sinks, toilets, lavatories, water coolers, etc. Coordinate with architectural plans for details on casework, furniture, etc.
4. Verify requirements of all equipment with shop drawing submittals prior to installation - notify Architect/Engineer of any conflicts between shop drawings and plans.
5. Coordinate locations of plumbing items that require access (i.e. isolation valves, balance valves, etc.) with reflected ceiling plan. Items located above hard non-accessible ceilings shall be provided with access doors as required.
6. Do not route/locate below grade piping below, or with 45 degrees of the bottom corner of, foundation walls/footings. Coordinate with structural trades prior to installing piping.
7. Verify clearance requirements of all electrical and mechanical equipment/systems prior to the installation of any new work. Plumbing equipment, piping, systems, etc. shall not interfere with electrical equipment spaces. Electrical conduit and equipment clearances shall not interfere with mechanical equipment spaces.

#### **1.04 INSPECTION OF SITE AND PROJECT DOCUMENTATION**

- A. The CONTRACTOR shall visit the site and examine/verify the conditions under which the work must be conducted before submitting proposal. Examine the drawings and specifications of all other trades including Mechanical, Architectural, Structural and Electrical.
- B. The submitting of a proposal implies that the CONTRACTOR has visited the site, examined all contract documents, and understands the conditions under which the work must be conducted.
- C. The CONTRACTOR shall notify the ARCHITECT and/or ENGINEER, prior to submitting his bid via Request For Information (RFI), of any potential problems that he has identified during his inspection of the site or from the review of plans/specifications. RFIs must be submitted at least 5 working days prior to bid opening.

#### **1.05 GENERAL SUPPORT REQUIREMENTS**

- A. Provide all necessary angle/brackets, hangers, or supplementary supporting steel as required for adequate support for all piping, ductwork, and equipment. Secure approval from Architect and/or Structural Engineer, in writing, before welding or bolting to steel framing or anchoring to concrete structure, or cutting/coring thru structural systems
- B. Where piping or equipment is supported or suspended from concrete construction, provide approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.
- C. Install plumbing and mechanical piping systems with adequate anchors, guides, expansion loops, etc. as required to provide for piping expansion/contraction.

#### **1.06 GUARANTEE**

- A. CONTRACTOR shall guarantee that all labor, materials, and equipment are free from defects and agrees to replace or repair any part of this installation which becomes defective within a period of one year from the date of substantial completion following final acceptance. Acceptance date of substantial completion shall be as determined by the ARCHITECT and/or ENGINEER.

- B. The CONTRACTOR shall file with the OWNER any and all guarantees from the equipment manufacturers including the operating conditions and performance capacities they are based on.

#### **1.07 CODES, PERMITS AND FEES**

- A. Refer to Division 1, General Conditions and Supplementary Conditions.
- B. Unless otherwise indicated, all required permits, plan reviews, licenses, inspections, approvals and fees for mechanical work shall be secured and paid for by the CONTRACTOR.
- C. All work shall be executed in accordance with the latest enforceable rules and regulations set forth in local and state codes.
  - 1. Mechanical and Plumbing systems shall be installed per current jurisdictional codes (International Mechanical Code, International Plumbing Code, International Fuel Gas Code, etc.), current NFPA codes (NFPA 101, NFPA 90, etc.), and applicable sections of the International Building Code.
- D. In the event that the plans and specifications conflict with any rules, regulations, or codes applying, said rules, regulations and codes shall govern.
- E. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.
- F. Contractor shall prepare any detailed drawings or diagrams which may be required by the governing authorities (i.e. fire protection plans, boiler room layouts, etc.).

#### **1.08 SUBSTITUTION ITEMS REQUIRING PRIOR APPROVAL**

- A. All items that the CONTRACTOR proposes to use in the work that are not specifically named in the contract documents must be submitted for review. Such items must be submitted to the ARCHITECT and/or ENGINEER for approval a minimum of ten (10) days prior to bid opening. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.

#### **1.09 MATERIAL AND EQUIPMENT MANUFACTURERS**

- A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of plumbing, heating, ventilating and air conditioning equipment and shall be the manufacturer's latest design.
- B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment of product provided shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Substitution Items Requiring Prior Approval specified in this Section of the Specifications. All costs to make these items of equipment comply with these requirements including, but not limited to, piping, sheet metal, electrical work, and building alterations shall be included in the original bid.
- C. All package unit skid mounted equipment that are factory assembled shall meet, in detail, the products named and specified within each section of the detailed mechanical and electrical specifications.

#### **1.10 OPERATION AND MAINTENANCE INSTRUCTIONAL MANUALS**

- A. Provide complete maintenance and operating instructional manuals covering all plumbing equipment as specified herein, Division 1 requirements, and individual equipment specification sections.

- B. The O&M data shall be bound in a suitable number of 3" or 4", 3-ring, hard cover binders. Permanently imprinted on the cover shall be the words, "Manufacturer's Operation and Maintenance Data", project title, location of project, and the date. A table of contents shall be provided in the front of each binder.
- C. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Each piece of equipment in the O&M manual shall be identified as identified on the project drawings (i.e. Domestic Water Heater DWH-1, Pump P-1, Grease Trap GT-1, etc.).
- D. Internally subdivide the binder contents with permanent page dividers, organized by specification section and/or major equipment/systems (i.e. Plumbing Equipment, Plumbing Fixtures, Plumbing Specialties, etc.)
- E. Contents: Each volume of O&M manual shall have three parts:
  - 1. Part 1: A directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: O&M data, arranged and subdivided by major equipment/systems. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers:
    - a. List of equipment.
    - b. Copies of Shop drawings and product data, approved by Architect/Engineer.
    - c. Installation and operational procedures.
    - d. Routine maintenance procedures.
    - e. Trouble shooting procedures.
    - f. Complete parts lists by nomenclature, manufacturer's part number and use.
    - g. Recommended spare parts lists.
    - h. Lubrication chart listing all types of lubricants to be used for each piece of equipment and the recommended frequency of lubrication.
    - i. Complete wiring and schematic diagrams.
    - j. Elevations and/or sections cut through all of the major equipment and sub-assemblies.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Testing, Adjusting, and Balance Reports (approved by Engineer).
    - b. Warranty Certificates.
    - c. Copies of approved construction permits.
- F. Maintenance and Operating manuals shall be provided to the ARCHITECT and/or ENGINEER for review when construction is 75% complete.
- G. A minimum of two (2) copies of all approved Operation and Maintenance literature shall be furnished to the OWNER within 10 days after final inspection. O&M manuals must be completed prior to start of OWNER training as the manuals shall be used as the basis of the training.

#### **1.11 RECORD DRAWINGS**

- A. The CONTRACTOR shall keep accurate notes of all deviations from the construction documents and discrepancies of construction on field drawings as they occur. The marked up field documents shall be available for review by the ARCHITECT and/or ENGINEER, and OWNER at their request.

**PART 2 PRODUCTS - NOT USED****PART 3 EXECUTION****3.01 INSTALLATION OF EQUIPMENT**

- A. Install equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the ARCHITECT and/or ENGINEER for resolution.

**3.02 WORK INVOLVING OTHER TRADES**

- A. Certain items of equipment or materials specified in the Plumbing Division may have to be installed by other trades due to code requirements or union jurisdictional requirements. In such instances, the Contractor shall complete the work through an approved, qualified subcontractor and shall include the full cost for same in his bid.

**3.03 COORDINATION**

- A. Install work to avoid interference with work of other trades including, but not limited to, architectural and electrical trades. Remove and relocate any work that causes an interference at CONTRACTOR's expense. Disputes regarding the cause of an interference shall be resolved by the ARCHITECT and/or ENGINEER.

**3.04 CHASE, SHAFTS AND RECESSES**

- A. Coordinate with structural, architectural and other trades to ensure accurate location and size of chases, shafts and recesses required for plumbing systems/piping.

**3.05 SLEEVES**

- A. Provide and install Schedule 40 black steel pipe sleeves, cut to length, wherever pipes pass through above grade walls and floors. Provide and install galvanized steel pipe sleeves, cut to length, wherever pipes pass through below grade foundation walls and slab on grade floors. Sleeves shall terminate flush with walls in finished areas. All sleeves through the floor are to extend two (2) inches above finish floor.
- B. Provide escutcheons at each penetration through walls, floors, and ceilings in exposed areas.
- C. Patch sleeves to match building material.

**3.06 SEALING OF PLUMBING OPENINGS**

- A. Seal the space around pipes and sleeves through walls, floors and ceilings.
- B. Provide adequate clearance to allow for proper pipe movement and sealing.
- C. Provide/install fireproof wall and floor sleeves as required by applicable building codes at all applicable wall, ceiling, and floor penetrations. Refer to Architectural plans for wall assembly ratings.
- D. Sleeves placed in floors shall be flush with the underside of the floor construction and shall have planed, square ends, extending 2 inches above the finished floor, unless otherwise noted or detailed.
- E. Where sleeves pass through reinforced concrete floors, they shall be properly set in position prior to concrete pouring in such a way that they will be maintained in position until the concrete is set.
- F. Pipes passing through below grade perimeter walls or slabs on grade shall have the space between the pipe and sleeve sealed watertight with a mechanically expandable elastomer seal device.
- G. Penetrations through fire rated floors and walls shall be firestopped in accordance with applicable building code requirements with UL and FMRC approved materials and shall have a

fire rating equal to or greater than the fire partition rating. Refer to architectural plans for locations and assembly ratings.

1. Packing: Refractory fiber or ceramic fiber.
  - a. Manufacturers:
    - 1) Carborundum Fiberfrax.
    - 2) Johns-Manville - Cerafelt.
    - 3) Eagle Picher Epitherm 1200.
    - 4) Babcock and Wilcox Kaowool.
2. Fire stop sealant.
  - a. Manufacturers:
    - 1) Hilti
    - 2) Tremco
    - 3) Mameco
    - 4) Pecora
3. For polypropylene (Acid Waste/Acid Vent piping) penetrations through fire rated assemblies, provide an intumescent firestop.
  - a. Hilti CP 642 Firestop Collar.
  - b. Hilti FS-ONE High Performance Intumescent Firestop Sealant.
  - c. 3M Fire Barrier PPD Plastic Pipe Device.
  - d. 3M Fire Barrier Intumescent Firestop Sealant.
4. Where combustible pipes, tubes, vents, etc. penetrate a fire rated assembly, such penetrations shall be protected by an approved through-penetration fire stop collar/sealant system per the building code.
  - a. Through -penetration firestop systems shall be tested in accordance with ASTM E814 with a minimum positive pressure differential of 0.01 inch WG. Through penetration firestop systems shall have a "F" rating and a "T" rating of not less than 1 hour but not less than the required rating of the assembly penetrated.
  - b. Hilti CP 642 Firestop Collar.
  - c. Hilti FS-ONE High Performance Intumescent Firestop Sealant.
  - d. 3M Fire Barrier PPD Plastic Pipe Device.
  - e. 3M Fire Barrier Intumescent Firestop Sealant.

### **3.07 CUTTING, CORING AND PATCHING**

- A. Refer to General Conditions
- B. The CONTRACTOR shall perform all cutting, coring, and patching that may be necessary for the installation of their Work. All cutting, coring, patching and repair work shall be performed by the CONTRACTOR through qualified Subcontractors. CONTRACTOR shall include full cost of same in his bid.
- C. Secure approval from Architect and/or Structural Engineer, in writing, before cutting, welding/bolting to, or anchoring from any structural building components (i.e. structural steel, load bearing walls, footings/foundations, concrete floors/ceilings, etc.).



**3.08 EXCAVATION AND BACKFILLING**

- A. Provide all excavation, trenching, tunneling and backfilling required for the plumbing work.
- B. Provide all pumping and/or well pointing required for the plumbing work.
- C. Provide foundations if required to support underground piping.
- D. Refer to Architectural/Structural specification sections for excavation and backfilling details.

**3.09 EQUIPMENT FOUNDATIONS AND SUPPORTS**

- A. Shall be as required or as shown on plans or specified.
- B. For equipment suspended from ceiling or walls, furnish and install all inserts, rods, structural steel frames, brackets and platforms required. Obtain approval of ARCHITECT and/or ENGINEER for same including loads, locations, and methods of attachment.

**3.10 EQUIPMENT CONNECTIONS**

- A. Make connections to equipment, fixtures and other items included in the work in accordance with the approved shop drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished.
- B. All piping connections to equipment shall be flanged or shall be made with unions to facilitate equipment removal.
- C. All piping connections to pumps, coils, and other equipment shall be installed without strain at the pipe connection of this equipment.
- D. Brass unions for connections of 2 inch and less and flanged union with dielectric gasket and bolt sleeves for 2-1/2 inch and greater shall be used for equipment connections of dissimilar metals.

**3.11 ACCESSIBILITY**

- A. All equipment shall be installed so as to be readily accessible for operation, maintenance, and repair, as required by the equipment manufacturer and as subject to the approval of the ENGINEER.

**3.12 CLEANING**

- A. Each trade shall be responsible for removing all debris daily as required to maintain the work area in a neat, orderly condition.
- B. After equipment and systems have been completed and tested, each entire system shall be cleaned and flushed.
- C. Prior to connection of new piping to existing piping systems, all new piping shall be subject to initial flushing, cleaning and final flushing. Provide temporary bypass piping and fittings, temporary valves and strainers, temporary water make-up piping with approved means of backflow prevention, and temporary pumps as needed to perform specified flushing and cleaning requirements.

**3.13 PAINTING**

- A. All plumbing systems, equipment, piping, etc. exposed in finished areas shall be painted to match the surrounding finishes. Refer to specification section 09900 - Coordinate color with Architect.

**3.14 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS**

- A. Electrical equipment furnished by Plumbing Trades and installed by Electrical Trades shall be turned over to Electrical Trades in good condition.
- B. Equipment and materials shall be protected from theft, injury or damage.
- C. Materials with enamel or glaze surface, shall be protected from damage by covering and/or

coating as recommended in bulletin, "Handling and Care of Enameled Cast Iron Plumbing Fixtures," issued by the Plumbing Fixtures Manufacturers Association, and as approved.

- D. Coat polished or plated metal parts with white petroleum jelly immediately after installation.
- E. Protect equipment outlets, pipe openings with temporary plugs or caps.
- F. Provide adequate storage for all equipment and materials delivered to the job site. Equipment set in place in unprotected areas must be provided with temporary protection.

### **3.15 GENERAL SUPPORT REQUIREMENTS**

- A. Each trade shall provide all required supporting components to properly support their work. Supporting components/systems shall be in accordance with Code and as specified.
- B. Provide all necessary angle/brackets or supplementary steel as required for adequate support for all piping, ductwork, specialties, and equipment. Secure approval from ARCHITECT and/or Structural ENGINEER, in writing, before welding or bolting to steel framing or anchoring to concrete structure.
- C. Where piping, specialties, or equipment is supported or suspended from concrete construction, provide approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.

### **3.16 DRAWINGS AND MEASUREMENTS**

- A. These specifications and accompanying drawings are intended to describe and provide for finished work. They are intended to be cooperative, and what is called for by either the drawings or specifications shall be as binding as if call for by both. The work herein described shall be complete in every detail.
- B. The Drawings are not intended to be scaled for rough-in measurements, nor to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement shall be taken by the Contractor. The Contractor shall check latest architectural drawings to locate equipment/fixtures/etc., check latest structural drawings for interferences, etc..

### **3.17 PIPING SYSTEMS TESTING**

- A. Test drainage piping systems in accordance with their respective and applicable governing codes. Test drainage and waste piping hydraulically by filling the system to its highest point or at a static head of 10 feet, whichever is higher.
- B. Pressure test plumbing piping (domestic cold water, domestic hot water, hot water recirculation, etc.) in accordance with governing and applicable codes. At minimum, test with water at 225 PSIG - permissible pressure drop shall be 0 PSIG over 2 hour period.
- C. Pressure test natural gas and propane gas piping in accordance with governing and applicable codes. At minimum, test with air at 100 PSIG - permissible pressure drop shall be 0 PSIG over 2 hour period.

### **3.18 DEMOLITION WORK**

- A. All demolition of existing plumbing equipment and materials shall be done by the Contractor unless otherwise indicated. Included are all items such as, but not limited to, existing piping, pumps, supports and equipment where such items are not required for the proper operation of the modified system.
- B. In general, demolition work is indicated on the drawings. However, the Contractor shall visit the job to determine the full extent and character of this work.
- C. Unless specifically noted to the contrary, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse. Salvaged materials of value that are not to be reused shall

remain the property of the Owner unless such ownership is waived. Remove items from the systems and turn over to the Owner in their condition prior to removal. The Owner shall move and store these materials. Items on which the Owner waives ownership shall become the property of the Contractor, who shall remove and legally dispose of, away from the premises.

- D. Work that has been cut or partially removed shall be protected against damage until covered by permanent construction.
- E. Clean and flush the interior and exterior of all existing relocated equipment and its related piping, valves, and accessories that are to be reused of all mud, debris, pipe dope, oils, welding slag, loose mill scale, rust and other extraneous material so that the existing equipment and all accessories can be repainted and repaired as required to place in first-class working condition.
- F. Where existing equipment is to be removed, cap piping under floor, behind face of wall, above ceiling or at mains.

### **3.19 WORK IN EXISTING BUILDINGS**

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed work. Promptly repair any damage to same at Contractor's expense.
- C. Consult with the ARCHITECT and/or ENGINEER as to the methods of carrying on the work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Architect and/or Owner's Representative.

### **3.20 EXTRA WORK**

- A. For any extra work which may be proposed, the Contractor shall furnish to the General Contractor/Construction Manager, an itemized breakdown of the estimated cost of all materials and labor required to complete this work. The estimate cost breakdown shall include unit prices (same prices for increase/decrease of work) for all materials (i.e. duct, piping, valves, equipment, equipment rental, etc.) and all labor (i.e. manhours, overtime, etc.) which may be required for any proposed extra work. The Contractor shall not proceed until receiving a written order from the General Contractor establishing the agreed price and describing the work to be done.

## **END OF SECTION**

## **SECTION 22 0553**

### **IDENTIFICATION FOR PLUMBING SYSTEMS AND EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Pipe Markers.

##### **1.02 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Brady Corp.
- B. Champion-America, Inc.
- C. Seton Identification Products.

##### **2.02 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: Conform to ANSI/ASME A13.1, unless specified otherwise.
  - 2. Letter Height: 1/2 to 1 inch to suit the size of equipment being labeled.
  - 3. Background Color: Conform to ANSI/ASME A13.1, unless specified otherwise.

##### **2.03 TAGS**

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- B. Chart: Typewritten letter size list in anodized aluminum frame.

##### **2.04 PIPE MARKERS**

- A. Comply with ASME A13.1.
- B. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.
- E. A pipe color code chart shall be permanently mounted near the door of each mechanical room.

#### **PART 3 EXECUTION**

##### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.

**3.02 INSTALLATION**

- A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Install plastic pipe markers in accordance with manufacturer's instructions.
- D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.
- F. Identify plumbing equipment (i.e. water heaters, pumps, boilers, heat transfer equipment, tanks, water treatment devices, etc.) with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.
- G. Identify piping, concealed or exposed, with plastic pipe markers. Use tags on piping 3/4 inch diameter and smaller. Identify service, flow direction, and unique pressure or temperature if necessary to distinguish between other systems. Install in clear view and align with axis of piping. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction. Arrows and markers shall be mounted to provide unobstructed visibility from floor level.
- H. Paint exposed piping per specification section 09900.

**END OF SECTION**

## **SECTION 22 1005**

### **PLUMBING PIPING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, valves, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Domestic water.
  - 3. Gas.

##### **1.02 REFERENCE STANDARDS**

- A. ANSI Z21.22 - American National Standard for Relief Valves and Automatic Gas Shutoff Devices for Hot Water Supply Systems.
- B. ASME B16.3 - Malleable Iron Threaded Fittings; The American Society of Mechanical Engineers.
- C. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers (ANSI B16.18).
- D. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers.
- E. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; The American Society of Mechanical Engineers.
- F. ASME B31.1 - Power Piping; The American Society of Mechanical Engineers (ANSI/ASME B31.1).
- G. ASME B31.9 - Building Services Piping; The American Society of Mechanical Engineers (ANSI/ASME B31.9).
- H. ASME (BPV IV) - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers; The American Society of Mechanical Engineers.
- I. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
- J. ASTM A 74 - Standard Specification for Cast Iron Soil Pipe and Fittings.
- K. ASTM A 234/A 234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service.
- L. ASTM B 32 - Standard Specification for Solder Metal.
- M. ASTM B 88 - Standard Specification for Seamless Copper Water Tube.
- N. ASTM B 88M - Standard Specification for Seamless Copper Water Tube (Metric).
- O. ASTM C 564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings.
- P. ASTM D 2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems.
- Q. ASTM D 2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings.
- R. ASTM D 2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings.
- S. ASTM D 3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and



Fittings.

- T. ASTM F 477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
- U. ASTM F 679 - Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings.
- V. AWS D10.9 - Specifications for Qualification of Welding Procedures and Welders for Piping and Tubing.
- W. AWWA C651 - Disinfecting Water Mains; American Water Works Association (ANSI/AWWA C651).
- X. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; Cast Iron Soil Pipe Institute.
- Y. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; Cast Iron Soil Pipe Institute.
- Z. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements.
- AA. ICC-ES AC106 - Acceptance Criteria for Pre drilled Fasteners (Screw Anchors) in Masonry Elements.
- BB. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements.
- CC. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements.
- DD. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- EE. MSS SP-70 - Cast Iron Gate Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- FF. MSS SP-71 - Cast Iron Swing Check Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- GG. MSS SP-78 - Cast Iron Plug Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- HH. MSS SP-80 - Bronze Gate, Globe, Angle and Check Valves; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- II. MSS SP-85 - Cast Iron Globe & Angle Valves, Flanged and Threaded Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- JJ. MSS SP-89 - Pipe Hangers and Supports - Fabrication and Installation Practices; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- KK. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc..
- LL. NFPA 54 - National Fuel Gas Code; National Fire Protection Association.
- MM. NFPA 58 - Liquefied Petroleum Gas Code; National Fire Protection Association.

### **1.03 SUBMITTALS**

- A. Project Record Documents: Record actual locations of valves.

### **1.04 QUALITY ASSURANCE**

- A. Perform Work in accordance with State of Michigan, standards.
- B. Valves: Bear UL and FMRC label or marking. Manufacturer's name and pressure rating marked on valve body.

- C. Solder containing lead may not be used for any systems.
- D. Test drainage piping systems in accordance with their respective and applicable governing codes. Test drainage and waste piping hydraulically by filling the system to its highest point or at a static head of 10 feet, whichever is higher.
- E. Pressure test plumbing piping (domestic cold water, domestic hot water, hot water recirculation, etc.) in accordance with governing and applicable codes. At minimum, test with water at 225 PSIG - permissible pressure drop shall be 0 PSIG over 2 hour period.
- F. Pressure test natural gas/propane gas piping, compressed air piping, vacuum air piping, in accordance with governing and applicable codes. At minimum, test with air at 100 PSIG - permissible pressure drop shall be 0 PSIG over 2 hour period.

#### **1.05 REGULATORY REQUIREMENTS**

- A. Perform Work in accordance with State and local plumbing and mechanical codes.
- B. Conform to applicable code for installation of backflow prevention devices.
- C. Provide certificate of compliance from authority having jurisdiction indicating approval of installation of backflow prevention devices.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary protective coating on cast iron and steel valves.
- C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

#### **1.07 FIELD CONDITIONS**

- A. Do not install underground piping when bedding is wet or frozen.

### **PART 2 PRODUCTS**

#### **2.01 SANITARY SEWER WASTE AND VENT PIPING (SAN, V), BURIED WITHIN 5 FEET OF BUILDING**

- A. Cast Iron Pipe: CISPI 301, hubless.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.
- B. PVC Pipe: ASTM D 2665 or ASTM D 3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D 2564 solvent cement.
  - 3. Note: All pipes passing under footings, or through foundation walls, shall be cast iron (hubless, service weight piping) or sleeved through a steel pipe sleeve.

#### **2.02 SANITARY WASTE AND VENT PIPING (SAN, V), ABOVE GRADE**

- A. Cast Iron Pipe: CISPI 301, hubless, service weight.
  - 1. Fittings: Cast iron.
  - 2. Joints: CISPI 310, neoprene gaskets and stainless steel clamp-and-shield assemblies.
- B. PVC Pipe: ASTM D 2665.
  - 1. Fittings: PVC.

2. Joints: Solvent welded, with ASTM D 2564 solvent cement.
3. Note: Only use PVC piping where allowed by Building Codes - do not use PVC piping exposed in occupied spaces, or in return air plenums.
4. Note: PVC piping is not approved for use where exposed to damage (i.e. surface mounted in a storage room, mechanical room, gymnasium, etc.).

### **2.03 DOMESTIC HOT WATER (HW), DOMESTIC COLD WATER (CW), AND DOMESTIC HOT WATER RETURN (HWR) PIPING, ABOVE GRADE**

- A. Copper Tube: ASTM B 88 (ASTM B 88M), Type L (B), Drawn (H).
  1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
  2. Joints: ASTM B 32, solder, Grade 95TA. Solder containing lead will not be permitted.
- B. Minimum System Pressure Rating: 125 psig.
- C. Isolation Valves: Ball valves for sizes 2 inch and smaller.

### **2.04 NATURAL GAS PIPING (G), BURIED WITHIN 5 FEET OF BUILDING**

- A. Steel Pipe: ASTM A 53/A 53M Schedule 40 black.
  1. Fittings: ASTM A 234/A 234M, wrought steel welding type.
  2. Joints: ASME B31.1, welded.
  3. Jacket: AWWA C105/A21.5 polyethylene jacket or double layer, half-lapped 10 mil polyethylene tape.
- B. Soft Copper Tubing: ASTM B88, seamless and jointless soft copper tubing may be used for sizes 2 inch and smaller. No solder joints shall be permitted on below grade copper tubing.
- C. For sizes 2" and less: Pre-sleeved stainless steel flexible gas pipe with fully ventable polyethylene sleeve. Manufacturer: OmegaFlex "TracPipe PS-2".

### **2.05 NATURAL GAS PIPING (G), ABOVE GRADE**

- A. Steel Pipe: ASTM A 53/A 53M Schedule 40 black.
  1. Fittings: ASME B16.3, malleable iron, or ASTM A 234/A 234M, wrought steel welding type.
  2. Joints: NFPA 54, threaded or welded to ASME B31.1.
- B. Isolation Valves: AGA approved and UL listed ball valves for sizes 3 inch and smaller and UL listed lubricated plug valves for sizes 4 inches and larger.

### **2.06 FLANGES, UNIONS, AND COUPLINGS**

- A. Unions for Pipe Sizes 2-1/2 inches and Under:
  1. Ferrous pipe: Class 150 malleable iron threaded unions.
  2. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Flanges for Pipe Size Over 2-1/2 inches:
  1. Ferrous pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
    - a. Flange Adapter: Flat face, ductile iron housings with elastomer pressure responsive gasket, for direct connection to ANSI Class 125 or 150 flanged components. Victaulic Style 741 (or approved equal).
  2. Copper tube and pipe: Class 150 slip-on bronze flanges; preformed neoprene gaskets.
- C. Dielectric Connections: Union or waterway fitting with galvanized or plated steel threaded end, grooved end, copper solder end, water impervious isolation barrier.

**2.07 PIPE HANGERS AND SUPPORTS****A. Plumbing Piping - Drain, Waste, and Vent:**

1. Conform to MSS SP-58.
2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
5. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
6. Vertical Support: Steel riser clamp.
7. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
8. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

**B. Plumbing Piping - Water:**

1. Conform to MSS SP-58.
2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Carbon steel, adjustable swivel, split ring.
3. Hangers for Cold Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
4. Hangers for Hot Pipe Sizes 2 Inches to 4 Inches: Carbon steel, adjustable, clevis.
5. Multiple or Trapeze Hangers: Steel channels with welded supports or spacers and hanger rods.
6. Multiple or Trapeze Hangers for Hot Pipe Sizes 6 Inches and Over: Steel channels with welded supports or spacers and hanger rods, cast iron roll.
7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
8. Wall Support for Pipe Sizes 4 Inches and Over: Welded steel bracket and wrought steel clamp.
9. Vertical Support: Steel riser clamp.
10. Floor Support for Cold Pipe: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.
11. Floor Support for Hot Pipe Sizes to 4 Inches: Cast iron adjustable pipe saddle, locknut, nipple, floor flange, and concrete pier or steel support.
12. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.

**C. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:**

1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
6. Other Types: As required.

**2.08 GATE VALVES****A. Manufacturers:**

1. Conbraco Industries: [www.conbraco.com](http://www.conbraco.com).

2. Nibco, Inc.: [www.nibco.com](http://www.nibco.com).
  3. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
- B. Up To and Including 3 Inches:
1. MSS SP-80, Class 125, bronze body, bronze trim, rising stem, handwheel, inside screw, solid wedge disc, solder or threaded ends.
- C. 3-1/2 inches and Larger:
1. MSS SP-70, Class 125, iron body, bronze trim, outside screw and yoke, handwheel, solid wedge disc, flanged ends. Provide chain-wheel operators for valves 6 inches and larger mounted over 8 feet above floor.

## **2.09 BALL VALVES**

- A. Manufacturers:
1. Conbraco Industries: [www.conbraco.com](http://www.conbraco.com).
  2. Nibco, Inc.: [www.nibco.com](http://www.nibco.com).
  3. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
- B. Construction, 2 Inches and Smaller: 300 psi CWP, forged brass two piece body, chrome plated brass ball and stem, regular port, TFE seats and seals, blow-out proof stem, lever handle.
- C. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder or threaded ends with union.
- D. Ball valves for natural gas service shall be UL labeled for such service.

## **2.10 PIPING TRANSITIONS**

- A. Manufacturers:
1. Can-Tex Industries Div. of Harsco Corp.; Model CT-Adapters:
  2. Fernco Joint Sealer Co.; Model PVC Donut
  3. Joint, Inc.; Model Caulder.
- B. Provide transitions for jointing two different types of pipe materials such as cast iron, clay, steel, plastic, or copper. Fabricate transitions with bushings capable of resisting normal moisture corrosion.

## **2.11 SURFACE PENETRATION SLEEVES**

- A. Manufacturers:
1. Thunderline Corp.; Model Link Seal:
- B. Sleeves: Schedule 40 weight, black, carbon steel pipe with anchor lugs, except where continuously welded seal rings are indicated.
- C. Mechanically expandable elastomer seal devices.
- D. Application: Seal pipes to sleeve through foundation floors, walls, underground or grade supported slabs.

# **PART 3 EXECUTION**

## **3.01 EXAMINATION**

- A. Verify that excavations are to required grade, dry, and not over-excavated.

**3.02 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with grooved couplings, flanges or unions.

**3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Establish elevations of buried piping outside the building to ensure not less than 4' of cover.
- H. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- I. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting. Refer to Section 09 9000.
- J. Install bell and spigot pipe with bell end upstream.
- K. Install valves with stems upright or horizontal, not inverted.
- L. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- M. Install water piping to ASME B31.9.
- N. Gas piping shall be painted per specification section 09900 and mechanical and building code requirements.
- O. Sleeve and vent gas piping that is concealed or buried below building slab per fuel gas code requirements.
- P. PVC Pipe: Make solvent-welded joints in accordance with ASTM D 2855.
- Q. Sleeve pipes passing through partitions, walls and floors.
- R. Each fixture shall have isolation valves provided. All run-outs from piping mains to fixtures shall have isolation valves installed near the main take-off, whether shown on the plans or not. All isolation valves shall be located in accessible locations.
- S. Minimum underground sanitary pipe size shall be 3".
- T. All fixtures shall be vented in accordance with a venting method approved by the ruling Plumbing Code.
- U. All plumbing vents through the roof shall be located a minimum of 24" from the edge of the parapet or edge of roof.
- V. All plumbing vents through the roof shall be located a minimum of 10 feet from any building outdoor air intake (i.e. louvers, windows, etc.).
- W. Do not route/locate below grade piping below, or with 45 degrees of the bottom corner of, foundation walls/footings. Coordinate with structural trades prior to installing piping.



**X. Inserts:**

1. Provide inserts for placement in concrete formwork.
2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut flush with top of slab.

**Y. Pipe Hangers and Supports:**

1. Install in accordance with MSS SP-89.
2. Support horizontal piping as scheduled.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Support vertical piping at every floor. Support riser piping independently of connected horizontal piping.
7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Refer to Section 09 9000. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
10. Support cast iron drainage piping at every joint.

**3.04 APPLICATION**

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

**3.05 TOLERANCES**

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope, for pipes 3 inches - 6 inches in diameter. Pipes smaller than 3 inches in diameter shall drain at minimum 1/4 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

**3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM**

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

### **3.08 SCHEDULES**

- A. Pipe Hanger Spacing:
  - 1. Metal Piping:
    - a. Pipe size: 1/2 inches to 1-1/4 inches:
      - 1) Maximum hanger spacing: 6.5 ft.
      - 2) Hanger rod diameter: 3/8 inches.
    - b. Pipe size: 1-1/2 inches to 2 inches:
      - 1) Maximum hanger spacing: 10 ft.
      - 2) Hanger rod diameter: 3/8 inch.
    - c. Pipe size: 2-1/2 inches to 3 inches:
      - 1) Maximum hanger spacing: 10 ft.
      - 2) Hanger rod diameter: 1/2 inch.
    - d. Pipe size: 4 inches to 6 inches:
      - 1) Maximum hanger spacing: 10 ft.
      - 2) Hanger rod diameter: 5/8 inch.
  - 2. Plastic Piping:
    - a. All Sizes:
      - 1) Maximum hanger spacing: 6 ft.
      - 2) Hanger rod diameter: 3/8 inch.

**END OF SECTION**

## **SECTION 23 0001**

### **GENERAL MECHANICAL REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION OF WORK**

- A. This Division includes all labor, materials, equipment, tools, supervision, start-up services, Owner training, etc., including all incidental and related items, necessary to complete installation and successfully test and start up and operate the mechanical systems indicated on the drawings, AND as described in each Section of Division 230000 Specifications.
- B. All drawings and General Provisions of the Contract, including the General Conditions, Supplementary General Conditions, and Division 1 specification sections, apply to work of all Division 230000 sections. The items in this section are not intended to supersede, but are supplementary to, the requirements set forth in other Divisions of the specifications.
- C. The Contractor, and his Subcontractors and Suppliers, shall include in their bid all materials, labor, and equipment involved, in accordance with all local customs, codes, rules, regulations; and secure compliance of all parts of the Specifications and Drawings regardless of Sectional inclusion in these Specifications.
- D. The Contractor shall be held responsible for the complete and satisfactory accomplishment of all Work inclusive of whatever miscellaneous material and/or appurtenances are required to perfect the installation, and demonstrate that all mechanical systems will operate satisfactorily under normal operating conditions.

##### **1.02 DRAWINGS**

- A. The drawings are diagrammatic and show the general location and arrangement of equipment, piping, ductwork and related items. They shall be followed as closely as elements of the construction will permit. The Contractor shall provide/install all mechanical systems, and associated equipment, complete and include all necessary offsets, fittings, and other components required due to interferences, space constraints, code requirements, etc. as required to provide a complete/functional system.
- B. The general mechanical requirements are intended to augment the drawings and specifications. Should conflicts occur between the drawings and the specifications, the strictest provision shall govern. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect and/or Engineer for resolution.
- C. The Contractor shall examine the drawings of all other trades in order to verify the conditions governing the work on the job site. Arrange work accordingly, providing all ductwork, piping, fittings, traps, valves and accessories as may be required to meet such conditions.
- D. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect and/or Engineer.
- E. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect and/or Engineer for resolution.

##### **1.03 COORDINATION OF WORK**

- A. The Contractor shall verify clearance requirements of all electrical and mechanical equipment/systems prior to the installation of any new work. Mechanical equipment, piping, ductwork, systems, etc. shall not interfere with mechanical equipment spaces or electrical

clearances. The Contractor shall coordinate his work to obtain symmetry in ceiling layouts, so that sprinkler heads, lights, diffusers, etc. are coordinated and are installed per the Architectural reflected ceiling plan.

- B. The Contractor and his Subcontractors shall be responsible for all tasks applicable to their work in accordance with the Specifications, Drawings, and code requirements, and shall be responsible for coordinating locations and arrangements of their work to give best results with all other relevant trades.
  - 1. Coordinate his work to obtain symmetry in ceiling layouts, so that sprinkler heads, lights, diffusers, etc. are coordinated and are installed per the Architectural reflected ceiling plan.
  - 2. Coordinate all wall, roof, floor penetrations, equipment pads, equipment locations, system routings, etc. with architectural and structural trades.
  - 3. Verify requirements of all equipment with shop drawing submittals prior to installation - notify Architect and/or Engineer of any conflicts between shop drawings and plans.
  - 4. Coordinate rough-in locations of mechanical control devices (i.e. thermostats, sensors, etc.) with electrical trades. T-stats shall be located @ 48" AFF unless noted otherwise.
  - 5. Coordinate locations of mechanical items that require access (i.e. isolation valves, balance valves, balance dampers, fire dampers, damper actuators, valve actuators, exhaust fans, filters, etc.) with reflected ceiling plan. Items located above hard non-accessible ceilings shall be provided with access doors as required.
  - 6. Verify clearance requirements of all electrical and mechanical equipment/systems prior to the installation of any new work. Mechanical equipment, piping, ductwork, systems, etc. shall not interfere with electrical equipment spaces. Electrical conduit and equipment clearances shall not interfere with mechanical equipment spaces.

#### **1.04 INSPECTION OF SITE AND PROJECT DOCUMENTATION**

- A. The Contractor shall visit the site and examine/verify the conditions under which the work must be conducted before submitting proposal. The Contractor shall examine the drawings and specifications of all other trades including Mechanical, Architectural, Structural and Electrical.
- B. The submitting of a proposal implies that the Contractor has visited the site, examined all contract documents, and understands the conditions under which the work must be conducted.
- C. The Contractor shall notify the Architect and/or Engineer, prior to submitting his bid via Request For Information (RFI), of any potential problems that he has identified during his inspection of the site or from the review of plans/specifications. RFIs must be submitted at least 5 working days prior to bid opening.

#### **1.05 GENERAL SUPPORT REQUIREMENTS**

- A. Provide all necessary angle/brackets, hangers, or supplementary supporting steel as required for adequate support for all piping, ductwork, and equipment. Secure approval from Architect and/or Structural Engineer, in writing, before welding or bolting to steel framing or anchoring to concrete structure, or cutting/coring thru structural systems.
- B. Where piping, ductwork, or equipment is supported or suspended from concrete construction, provide approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.
- C. Install mechanical piping systems with adequate anchors, guides, expansion loops, etc. as required to provide for piping expansion/contraction.

#### **1.06 GUARANTEE**

- A. Contractor shall guarantee that all labor, materials, and equipment are free from defects and agrees to replace or repair any part of this installation which becomes defective within a period of one year from the date of substantial completion following final acceptance. Acceptance date of

substantial completion shall be as determined by the Architect and/or Engineer.

- B. The Contractor shall file with the Owner any and all guarantees from the equipment manufacturers including the operating conditions and performance capacities they are based on.

#### **1.07 CODES, PERMITS AND FEES**

- A. Refer to Division 1, General Conditions and Supplementary Conditions.
- B. Unless otherwise indicated, all required permits, plan reviews, licenses, inspections, approvals and fees for mechanical work shall be secured and paid for by the Contractor.
- C. All work shall be executed in accordance with the most current rules and regulations set forth in local and state codes.
  - 1. Mechanical and Plumbing systems shall be installed per current jurisdictional codes (International Mechanical Code, International Plumbing Code, International Fuel Gas Code, International Building Code, etc.), current NFPA codes (NFPA 101, NFPA 90, etc.), and applicable sections of the Michigan Building Code.
- D. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern. In the event that the plans and specifications conflict with any rules, regulations, or codes applying, said rules, regulations and codes shall govern.

#### **1.08 SUBSTITUTION ITEMS REQUIRING PRIOR APPROVAL**

- A. All items that the Contractor proposed to use in the work that are not specifically named in the contract documents must be submitted for review. Such items must be submitted in duplicate to the Architect and/or Engineer for approval a minimum of ten (10) days prior to bid opening. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.

#### **1.09 MATERIAL AND EQUIPMENT MANUFACTURERS**

- A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of plumbing, heating, ventilating and air conditioning equipment and shall be the manufacturer's latest design.
- B. If an approved manufacturer is other than the manufacturer used as the basis for design, the equipment of product provided shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Substitution Items Requiring Prior Approval specified in this Section of the Specifications. All costs to make these items of equipment comply with these requirements including, but not limited to, piping, sheet metal, electrical work, and building alterations shall be included in the original bid.
- C. All package unit skid mounted equipment that are factory assembled shall meet, in detail, the products named and specified within each section of the detailed mechanical and electrical Specifications.

#### **1.10 OPERATION AND MAINTENANCE INSTRUCTIONAL MANUALS**

- A. Provide complete maintenance and operating instructional manuals covering all mechanical equipment as specified herein, Division 1 requirements, and individual equipment specification sections.
- B. The O&M data shall be bound in a suitable number of 3" or 4", 3-ring, hard cover binders.

Permanently imprinted on the cover shall be the words, "Manufacturer's Operation and Maintenance Data", project title, location of project, and the date. A table of contents shall be provided in the front of each binder.

- C. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Each piece of equipment in the O&M manual shall be identified as identified on the project drawings (i.e. Air Handling Unit AHU-1, Pump P-1, etc.).
- D. Internally subdivide the binder contents with permanent page dividers, organized by specification section and/or major equipment/systems (i.e. Boilers, Air Handling Units, Temperature Controls, etc.)
- E. Contents: Each volume of O&M manual shall have three parts:
  - 1. Part 1: A directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
  - 2. Part 2: O&M data, arranged and subdivided by major equipment/systems. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers:
    - a. List of equipment.
    - b. Copies of Shop drawings and product data, approved by Architect/Engineer.
    - c. Installation and operational procedures.
    - d. Routine maintenance procedures.
    - e. Trouble shooting procedures.
    - f. Complete parts lists by nomenclature, manufacturer's part number and use.
    - g. Recommended spare parts lists.
    - h. Lubrication chart listing all types of lubricants to be used for each piece of equipment and the recommended frequency of lubrication.
    - i. Complete wiring and schematic diagrams.
    - j. Elevations and/or sections cut through all of the major equipment and sub-assemblies.
    - k. At the end of each section, a maintenance schedule shall be provided for each piece of equipment. The schedule shall display the daily, weekly, monthly, semi-annual, and annual lubrication and preventative maintenance required in order to meet warranty conditions and the manufacturer's recommendations for optimal performance and life of the equipment. Photos or reproduction of the manufacturer's literature will not be accepted.
  - 3. Part 3: Project documents and certificates, including the following:
    - a. Testing, Adjusting, and Balance Reports (approved by Engineer).
    - b. Warranty Certificates.
    - c. Copies of approved construction permits.
- F. Maintenance and Operating manuals shall be provided to the Architect and/or Engineer for review when construction is 75% complete.
- G. A minimum of two (2) copies of all approved Operation and Maintenance literature shall be furnished to the Owner within 10 days after final inspection. O&M manuals must be completed prior to start of Owner training as the manuals shall be used as the basis of the training.

#### **1.11 SHOP DRAWINGS/SUBMITTALS**

- A. Refer to General Conditions and Supplementary General Conditions.



- B. All shop drawings shall be submitted in groupings of similar and/or related items. Incomplete submittal groupings will be returned unchecked.
- C. Unless noted otherwise, submit digital (.pdf format) copies of complete manufacturer's shop drawings for all equipment, valves, plumbing and heating specialties, refrigeration specialties, pipe hangers, wiring diagrams and control diagrams including, but not limited to the items listed below. Where items are referred to by symbolic designation on the drawings and specifications, all submittals shall bear the same designation. Refer to other Sections of the mechanical specifications for additional requirements.

23 0713 Duct Insulation

23 7413 Packaged Outdoor Air-Handling Units

## **1.12 INSTRUCTION OF OWNER PERSONNEL**

- A. Before final inspection the Contractor shall instruct Owner's designated personnel in operation, adjustment and maintenance of mechanical equipment and systems at agreed upon times.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use Operation and Maintenance Manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.
- E. Training shall be provided by factory authorized/trained representatives familiar with the startup and training on the equipment.

## **1.13 RECORD DRAWINGS**

- A. Contractor shall submit to the Architect and/or Engineer, record drawings which have been neatly marked to represent as-built conditions for all new mechanical work.
- B. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the concealed conditions and other items of construction on field drawings as they occur. The marked up field documents shall be available for review by the Architect and/or Engineer, and Owner at their request.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 INSTALLATION OF EQUIPMENT**

- A. Install equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect and/or Engineer for resolution.

### **3.02 WORK INVOLVING OTHER TRADES**

- A. Certain items of equipment or materials specified in the Mechanical Division may have to be installed by other trades due to code requirements or union jurisdictional requirements. In such instances, the Contractor shall complete the work through an approved, qualified subcontractor and shall include the full cost for same in his bid.

### **3.03 LUBRICATION**

- A. Provide all lubrication for the operation of the mechanical equipment until acceptance by the Owner. Contractor shall be responsible for all damage to bearings up to the date of acceptance of the equipment. Protect all bearings and shafts during installation. Thoroughly grease steel shafts to prevent corrosion. Provide covers as required for proper protection of all motors and

other equipment during construction.

### **3.04 COORDINATION**

- A. Install work to avoid interference with work of other trades including, but not limited to, architectural and electrical trades. Remove and relocate any work that causes an interference at Contractor's expense. Disputes regarding the cause of an interference shall be resolved by the Architect and/or Engineer.

### **3.05 CHASE, SHAFTS AND RECESSES**

- A. Coordinate with structural, architectural and other trades to ensure accurate location and size of chases, shafts and recesses required for mechanical systems.

### **3.06 SLEEVES**

- A. Provide and install Schedule 40 black steel pipe sleeves, cut to length, wherever pipes pass through above grade walls and floors. Provide and install galvanized steel pipe sleeves, cut to length, wherever pipes pass through below grade foundation walls and slab on grade floors. Sleeves shall terminate flush with walls in finished areas. All sleeves through the floor are to extend two (2) inches above finish floor.
- B. Provide escutcheons at each penetration through walls, floors, and ceilings in exposed areas.
- C. Patch sleeves to match building material.

### **3.07 SEALING OF MECHANICAL OPENINGS**

- A. Seal the space around pipes in sleeves and around duct openings through walls, floors and ceilings.
- B. Provide adequate clearance to allow for proper duct/pipe movement and sealing.
- C. Provide/install fireproof wall and floor sleeves as required by applicable building codes at all applicable wall, ceiling, and floor penetrations. Refer to Architectural plans for wall assembly ratings.
- D. Sleeves placed in floors shall be flush with the underside of the floor construction and shall have planed, square ends, extending 2 inches above the finished floor, unless otherwise noted or detailed.
- E. Where sleeves pass through reinforced concrete floors, they shall be properly set in position prior to concrete pouring in such a way that they will be maintained in position until the concrete is set.
- F. Ducts and pipes passing through below grade perimeter walls or slabs on grade shall have the space between the duct/pipe and sleeve sealed watertight with a mechanically expandable elastomer seal device.
- G. Penetrations through fire rated floors and walls shall be firestopped in accordance with applicable building code requirements with UL and FMRC approved materials and shall have a fire rating equal to or greater than the fire partition rating. Refer to architectural plans for locations and assembly ratings.
  - 1. Packing: Refractory fiber or ceramic fiber.
    - a. Manufacturers:
      - 1) Carborundum Fiberfrax.
      - 2) Johns-Manville - Cerafelt.
      - 3) Eagle Picher Epitherm 1200.
      - 4) Babcock and Wilcox Kaowool.
  - 2. Fire stop sealant.

- a. Manufacturers:
  - 1) Hilti
  - 2) Tremco
  - 3) Mameco
  - 4) Pecora
- 3. Where combustible pipes, tubes, vents, etc. penetrate a fire rated assembly, such penetrations shall be protected by an approved through-penetration fire stop collar/sealant system per the building code.
  - a. Through -penetration firestop systems shall be tested in accordance with ASTM E814 with a minimum positive pressure differential of 0.01 inch WG. Through penetration firestop systems shall have a "F" rating and a "T" rating of not less than 1 hour but not less than the required rating of the assembly penetrated.
  - b. Hilti CP 642 Firestop Collar.
  - c. Hilti FS-ONE High Performance Intumescent Firestop Sealant.
  - d. 3M Fire Barrier PPD Plastic Pipe Device.
  - e. 3M Fire Barrier Intumescent Firestop Sealant.

### **3.08 CUTTING, CORING AND PATCHING**

- A. Refer to General Conditions.
- B. Unless specifically noted otherwise, the Contractor shall perform all cutting, coring, and patching that may be necessary for the installation of their Work. All cutting, coring, patching and repair work shall be performed by the Contractor through qualified Subcontractors. Contractor shall include full cost of same in his bid.
- C. Secure approval from Architect and/or Structural Engineer, in writing, before cutting, welding/bolting to, or anchoring from any structural building components (i.e. structural steel, load bearing walls, footings/foundations, concrete floors/ceilings, etc.).

### **3.09 EXCAVATION AND BACKFILLING**

- A. Provide all excavation, trenching, tunneling and backfilling required for the mechanical work.
- B. Provide foundations if required to support underground piping.
- C. Refer to Architectural/Structural specification sections for excavation and backfilling details.

### **3.10 EQUIPMENT FOUNDATIONS AND SUPPORTS**

- A. Shall be as required or as shown on plans or specified.
- B. Provide concrete housekeeping pads for all floor mounted mechanical equipment (i.e. air handlers, condensing units, etc.). Concrete housekeeping pads shall be installed by qualified concrete trade subcontractors. Concrete housekeeping pads shall be poured before equipment is installed, minimum 4" tall. Contractor shall include full cost of concrete housekeeping pads in his bid.
- C. For equipment suspended from ceiling or walls, furnish and install all inserts, rods, structural steel frames, brackets and platforms required. Obtain approval of Architect and/or Structural Engineer for same including loads, locations, and methods of attachment.

### **3.11 EQUIPMENT CONNECTIONS**

- A. Make connections to equipment, fixtures and other items included in the work in accordance with the approved shop drawings and rough-in measurements furnished by the manufacturers of the particular equipment furnished.

- B. All piping connections to equipment shall be flanged or shall be made with unions to facilitate equipment removal.
- C. Brass unions for connections of 2 inch and less and flanged union with dielectric gasket and bolt sleeves for 2-1/2 inch and greater shall be used for equipment connections of dissimilar metals.
- D. All ductwork connections to air handling equipment shall be made with flexible duct connectors.

### **3.12 ACCESSIBILITY**

- A. All equipment shall be installed so as to be readily accessible for operation, maintenance, and repair, as required by the equipment manufacturer and as subject to the approval of the Engineer.

### **3.13 CLEANING**

- A. Each trade shall be responsible for removing all debris daily as required to maintain the work area in a neat, orderly condition.
- B. After equipment, ductwork, piping systems have been completed and tested, each entire system shall be cleaned and flushed.
- C. Prior to connection of new piping to existing piping systems, all new piping shall be subject to initial flushing, cleaning and final flushing. Provide temporary bypass piping and fittings, temporary valves and strainers, temporary water make-up piping with approved means of backflow prevention, and temporary pumps as needed to perform specified flushing and cleaning requirements.

### **3.14 PAINTING**

- A. All mechanical systems, equipment, piping, ductwork, etc. exposed in finished areas shall be painted to match the surrounding finishes. Refer to specification section 09900 - Coordinate color with Architect.

### **3.15 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS**

- A. Electrical equipment furnished by Mechanical Trades and installed by Electrical Trades shall be turned over to Electrical Trades in good condition.
- B. Equipment and materials shall be protected from theft, injury or damage.
- C. Materials with enamel or glaze surface, shall be protected from damage by covering and/or coating as recommended in bulletin, "Handling and Care of Enameled Cast Iron Plumbing Fixtures," issued by the Plumbing Fixtures Manufacturers Association, and as approved.
- D. Coat polished or plated metal parts with white petroleum jelly immediately after installation.
- E. Protect equipment outlets, pipe and duct openings with temporary plugs or caps.
- F. Provide adequate storage for all equipment and materials delivered to the job site. Equipment set in place in unprotected areas must be provided with temporary protection.

### **3.16 FILTERS**

- A. Provide and maintain filters in air handling systems throughout the construction period and prior to final acceptance of the building. Do not run air handling equipment without all prefilters and final filters as specified.
- B. Immediately prior to final building acceptance by the Owner, the Contractor shall:
  - 1. Thoroughly wash, recharge and reinstall cleanable type air filters.
  - 2. Replace all disposable type air filters, prefilters and final filters, with new units. In addition to replacing the filters with new ones, the contractor shall supply the Owner with an extra set of each filter for the Owner's use.

### **3.17 GENERAL SUPPORT REQUIREMENTS**

- A. Each mechanical trade shall provide all required supporting components to properly support their work. Supporting components/systems shall be in accordance with Code and as specified.
- B. Provide all necessary angle/brackets or supplementary steel as required for adequate support for all piping, ductwork, specialties, and equipment. Secure approval from Architect and/or Engineer, in writing, before welding or bolting to steel framing or anchoring to concrete structure.
- C. Where piping, ductwork, specialties, or equipment is supported or suspended from concrete construction, provide approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.
- D. Hangers for ductwork 48 inches and wider located in Mechanical Rooms shall be sized to also support fire protection system branch piping.

### **3.18 DRAWINGS AND MEASUREMENTS**

- A. These specifications and accompanying drawings are intended to describe and provide for finished work. They are intended to be cooperative, and what is called for by either the drawings or specifications shall be as binding as if call for by both. The work herein described shall be complete in every detail.
- B. The Drawings are not intended to be scaled for rough-in measurements, nor to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement shall be taken by the Contractor. The Contractor shall check latest architectural drawings to locate equipment/fixtures/etc., check latest structural drawings for interferences, etc..

### **3.19 EXTRA WORK**

- A. For any extra work which may be proposed, the Contractor shall furnish to the General Contractor/Construction Manager, an itemized breakdown of the estimated cost of all materials and labor required to complete this work. The estimate cost breakdown shall include unit prices (same prices for increase/decrease of work) for all materials (i.e. duct, piping, valves, equipment, equipment rental, etc.) and all labor (i.e. manhours, overtime, etc.) which may be required for any proposed extra work. The Contractor shall not proceed until receiving a written order from the General Contractor establishing the agreed price and describing the work to be done.

### **3.20 DEMOLITION WORK**

- A. All demolition of existing mechanical equipment and materials shall be done by the Contractor unless otherwise indicated. Included are all items such as, but not limited to, existing piping, pumps, ductwork, supports and equipment where such items are not required for the proper operation of the modified system.
- B. In general, demolition work is indicated on the drawings. However, the Contractor shall visit the job to determine the full extent and character of this work.
- C. The Contractor shall review all other contract documents (i.e. architectural plans, electrical plans, etc.) to review the extent of demolition and remodeling work.
- D. Unless specifically noted to the contrary, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived. Remove items from the systems and turn over to the Owner in their condition prior to removal. The Owner shall move and store these materials. Items on which the Owner waives ownership shall become the property of the Contractor, who shall remove and legally dispose of, away from the premises.
- E. Work that has been cut or partially removed shall be protected against damage until covered by permanent construction.
- F. Clean and flush the interior and exterior of all existing relocated equipment and its related piping, valves, and accessories that are to be reused of all mud, debris, pipe dope, oils, welding slag,

loose mill scale, rust and other extraneous material so that the existing equipment and all accessories can be repainted and repaired as required to place in first-class working condition.

- G. Where existing equipment is to be removed, cap piping under floor, behind face of wall, above ceiling or at mains.
- H. Provide sheet metal caps on ductwork and cap piping immediately adjacent to demolition as soon as demolition commences in order to allow existing systems to remain in operation. Caps shall be of same material as service requiring such.

### **3.21 WORK IN EXISTING BUILDINGS**

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once work is started in the existing building, shall complete same without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed work. Promptly repair any damage to same at Contractor's expense.
- C. Consult with the Architect and/or Engineer as to the methods of carrying on the work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Architect and/or Owner's Representative.

## **END OF SECTION**



## **SECTION 23 0553**

### **IDENTIFICATION FOR HVAC SYSTEMS AND EQUIPMENT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.

##### **1.02 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems; The American Society of Mechanical Engineers.

#### **PART 2 PRODUCTS**

##### **2.01 IDENTIFICATION APPLICATIONS**

- A. Air Handling Units: Nameplates.
- B. Automatic Controls: Tags. Key to control schematic.
- C. Control Panels: Nameplates.
- D. Ductwork: Plastic Tape Duct Markers.
- E. Instrumentation: Tags.
- F. Major Control Components: Nameplates.
- G. Small-sized Equipment: Tags.
- H. Thermostats: Nameplates.

##### **2.02 MANUFACTURERS**

- A. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
- B. Champion America, Inc.: [www.Champion-America.com](http://www.Champion-America.com).
- C. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).

##### **2.03 NAMEPLATES**

- A. Description: Laminated three-layer plastic with engraved letters.
  - 1. Letter Color: Conform to ANSI/ASME A13.1, unless specified otherwise.
  - 2. Letter Height: 1/2 inch.
  - 3. Background Color: Conform to ANSI/ASME A13.1, unless specified otherwise.

##### **2.04 TAGS**

- A. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.

##### **2.05 DUCT MARKERS**

- A. Plastic Tape Duct Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

#### **PART 3 EXECUTION**

##### **3.01 PREPARATION**

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Verify Owner's existing identification standard and provide new identification to match.

##### **3.02 INSTALLATION**

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

- B. Install tags with corrosion resistant chain.
- C. Identify mechanical equipment (i.e. air handling units, condensing units, etc.) with plastic nameplates.
- D. Identify control panels and major control components outside panels with plastic nameplates.
- E. Identify thermostats, CO2 sensors, humidity sensors, etc...with nameplates.
- F. Identify ductwork (i.e. Supply Air, Return Air, Outdoor Air, Fresh Air, Exhaust Air, etc.) with plastic tape duct markers. Identify with air handling unit identification number and area served. Locate identification on ductwork at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction, at each riser, and at straight runs not to exceed 20' apart.
- G. Paint exposed ductwork per specification section 09900.

## **END OF SECTION**

## **SECTION 23 0593**

### **TESTING, ADJUSTING, AND BALANCING FOR HVAC**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.

##### **1.02 REFERENCE STANDARDS**

- A. AABC MN-1 - AABC National Standards for Total System Balance; Associated Air Balance Council.
- B. ASHRAE Std 111 - Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc..
- C. NEBB (TAB) - Procedural Standards for Testing Adjusting Balancing of Environmental Systems; National Environmental Balancing Bureau.

##### **1.03 SUBMITTALS**

- A. Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
- B. Sample Report Forms: Submit two sets of sample TAB report forms.
- C. Certified TAB Reports: Submit two copies of reports prepared, as specified in this Section, on approved forms certified by TAB firm.
- D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.
- E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
  - 1. Prior to commencing work, submit report forms or outlines indicating adjusting, balancing, and equipment data required.
  - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for ENGINEER and for inclusion in operating and maintenance manuals.
  - 3. Provide reports in soft cover, letter size, 3-ring binder manuals, complete with index page and indexing tabs, with cover identification at front and side. Include set of reduced drawings with air outlets and equipment identified to correspond with data sheets, and indicating thermostat locations.
  - 4. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
  - 5. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
  - 6. Units of Measure: Report data in I-P (inch-pound) units only.
  - 7. Test Reports: Indicate data on AABC MN-1 forms, NEBB forms, or forms containing information indicated in Schedules.
  - 8. Include the following on the title page of each report:
    - a. Name of Testing, Adjusting, and Balancing Agency.

- b. Address of Testing, Adjusting, and Balancing Agency.
  - c. Telephone number of Testing, Adjusting, and Balancing Agency.
  - d. Project name.
  - e. Project location.
  - f. Project ENGINEER.
  - g. Project Engineer.
  - h. Project CONTRACTOR.
  - i. Project altitude.
  - j. Report date.
- F. Project Record Documents: Record actual locations of flow measuring stations and balancing valves and rough setting.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 GENERAL REQUIREMENTS**

- A. Perform total system balance in accordance with one of the following:
  - 1. AABC MN-1, AABC National Standards for Total System Balance.
  - 2. NEBB Procedural Standards for Testing Adjusting Balancing of Environmental Systems.
  - 3. Maintain at least one copy of the standard to be used at project site at all times.
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
  - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
  - 2. Having minimum of five years documented experience.
  - 3. Certified by one of the following:
    - a. AABC, Associated Air Balance Council: [www.aabchq.com](http://www.aabchq.com); upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: [www.nebb.org](http://www.nebb.org).
  - 4. And/Or one of the following Pre-Qualified TAB Agencies.
- E. Pre-Qualified TAB Agencies:
  - 1. Integrity Test & Balance, Inc.: 10381 E. Cherry Bend Rd. #A, Traverse City, MI 49684, (231-929-0940) - Contact Kevin Heikkila (cell: 231-499-5666)..
  - 2. International Test & Balance Inc.: Southfield, MI (248-559-5864).
  - 3. Aerodynamics Inspecting Co.: Dearborn, MI (313-584-7450).
  - 4. Hi-Tech Test & Balance: Freeland, MI (989-695-5498).

**3.02 SEQUENCING AND SCHEDULING**

- A. Sequence work to commence after completion of systems and schedule completion of work before Substantial Completion of Project.
- B. The mechanical contractor shall provide to the TAB sub-contractor all shop drawings, submittal data, up-to-date revisions, change orders, bulletins, and other data required for the planning, preparation, and execution of the TAB work.
- C. The mechanical contractor shall provide startup personnel to assist the TAB sub-contractor in testing, adjusting, and balancing work.
- D. If testing, adjusting, and balancing of a mechanical system cannot take place due to seasonal weather, all parties involved (i.e. mechanical contractor and test/balance agency) shall return to the site during season required to properly test, adjust and balance the equipment. An example of this would be a heating system installed and tested in the cooling season (summer). Due to the fact that there may not be enough heating load required to properly test and balance the heating systems, all parties shall return to the site the following heating season (winter) to test, adjust, and balance the heating system.
- E. All test points, balance dampers, mechanical identification, etc. shall be complete and accessible to the TAB sub-contractor.

**3.03 EXAMINATION**

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Proper thermal overload protection is in place for electrical equipment.
  - 4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 5. Duct systems are clean of debris.
  - 6. Fans are rotating correctly.
  - 7. Fire and volume dampers are in place and open.
  - 8. Air coil fins are cleaned and combed.
  - 9. Access doors are closed and duct end caps are in place.
  - 10. Air outlets are installed and connected.
  - 11. Duct system leakage is minimized.
- B. Examine system and equipment installations to verify that they are complete and that testing, cleaning, adjusting, and commissioning specified in individual Sections have been performed.
- C. Examine system and equipment test reports.
- D. Examine HVAC system and equipment installations to verify that indicated manual volume dampers are properly installed and that their locations are accessible and appropriate for effective balancing and for efficient system and equipment operation.
- E. Examine HVAC equipment to ensure that clean filters have been installed, bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
- F. Examine equipment for installation and for properly operating safety interlocks and controls.
- G. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from

indicated values.

- H. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- I. Promptly report abnormal conditions in mechanical systems or conditions which prevent system balance.
- J. Beginning of work means acceptance of existing conditions.

### **3.04 PREPARATION**

- A. Hold a pre-balancing meeting 3 weeks prior to starting TAB work.
  - 1. Require attendance by all installers whose work will be tested, adjusted, or balanced.
- B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to ENGINEER to facilitate spot checks during testing.
- C. Provide additional balancing devices as required.
- D. Prepare a TAB plan that includes strategies and step-by-step procedures.
- E. Perform the following field tests and inspections to new and renovated portions of duct systems according to SMACNA's "HVAC Air Duct Leakage Test Manual" and prepare test reports:
  - 1. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
  - 2. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
  - 3. Maximum Allowable Leakage: Comply with requirements for Leakage Class 3 for round and flat-oval ducts, Leakage Class 12 for rectangular ducts in pressure classes lower than and equal to 2-inch wg (both positive and negative pressures), and Leakage Class 6 for pressure classes from 2- to 10-inch wg.
  - 4. Remake leaking joints and retest until leakage is equal to or less than maximum allowable.
- F. Complete system readiness checks and prepare system readiness reports. Verify the following:
  - 1. Permanent electrical power wiring is complete.
  - 2. Equipment and duct access doors are securely closed.
  - 3. Balance, smoke, and fire dampers are open.
  - 4. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
  - 5. Windows and doors can be closed so indicated conditions for system operations can be met.

### **3.05 ADJUSTMENT TOLERANCES**

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

### **3.06 RECORDING AND ADJUSTING**

- A. Ensure recorded data represents actual measured or observed conditions.
- B. Permanently mark settings of dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.



- C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- E. At final inspection, recheck random selections of data recorded in report. Recheck points or areas as selected and witnessed by the OWNER.
- F. Check and adjust systems approximately six months after final acceptance and submit report.

### **3.07 AIR SYSTEM PROCEDURE**

- A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
- B. Prepare schematic diagrams of systems' "as-built" duct layouts, or use reduced scale contract documents with notations.
- C. Determine the best locations in main and branch ducts for accurate duct airflow measurements.
- D. Cut insulation, and drill ducts for installation of test probes to the minimum extent necessary to allow adequate performance of procedures. After testing and balancing, close probe holes with neat patches, neoprene plugs, threaded plugs, or threaded twist-on metal caps, and patch insulation with new materials identical to those removed. Restore vapor barrier and finish according to insulation Specifications for this Project.
- E. Check air flow within intake plenums and mixing boxes of air handling units for uneven flow and temperature stratification and prepare a report with profile elevations (temperature and velocity) on each coil or filter face for Architect.
- F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
- G. Verify that motor starters are equipped with properly sized thermal protection.
- H. Check dampers for proper position to achieve desired airflow path.
- I. Check for airflow blockages.
- J. Check for proper sealing of air duct system.
- K. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- L. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- M. Measure air quantities at air inlets and outlets.
- N. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.
- O. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- P. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- Q. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- R. Measure building static pressure and adjust supply, return, and exhaust air systems to provide required relationship between each to maintain approximately 0.05 inches positive static pressure near the building entries.

### 3.08 PROCEDURES FOR CONSTANT VOLUME AIR SYSTEMS

- A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
  - 1. Measure fan static pressures to determine actual static pressure as follows:
    - a. Measure outlet static pressure as far downstream from the fan as practicable and upstream from restrictions in ducts such as elbows and transitions.
    - b. Measure static pressure directly at the fan outlet.
    - c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from flexible connection and downstream from duct restrictions.
    - d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
  - 2. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
    - a. Simulate dirty filter operation and record the point at which maintenance personnel must change filters.
  - 3. Do not recommend fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full cooling, full heating, economizer, and any other operating modes to determine the maximum required brake horsepower.
- B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
  - 1. Measure airflow at a point downstream from the balancing damper and adjust volume dampers until the proper airflow is achieved.
    - a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
  - 2. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
- C. Adjust terminal outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using volume dampers rather than extractors and the dampers at air terminals.
  - 1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
  - 2. Adjust patterns of adjustable outlets for proper distribution without drafts.

### 3.10 INSPECTIONS

- A. Initial Inspection:
  - 1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the Final Report.
  - 2. Randomly check the following for each system:
    - a. Measure airflow of at least 10 percent of air outlets.
    - b. Measure space pressure of at least 10 percent of locations.

- c. Verify that balancing devices are marked with final balance position.
  - d. Note deviations to the Contract Documents in the Final Report.
- B. Final Inspection:
- 1. After initial inspection is complete and evidence by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Owner.
  - 2. TAB firm test and balance engineer shall conduct the inspection in the presence of Owner.
  - 3. Owner shall randomly select measurements documented in the final report to be rechecked. The rechecking shall be limited to either 10 percent of the total measurements recorded, or the extent of measurements that can be accomplished in a normal 8-hour business day.
  - 4. If the rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
  - 5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
  - 6. TAB firm shall recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes and resubmit the final report.
  - 7. Request a second final inspection. If the second final inspection also fails, Owner shall contract the services of another TAB firm to complete the testing and balancing in accordance with the Contract Documents and deduct the cost of the services from the final payment.

### 3.11 SCOPE

- A. Test, adjust, and balance the following:
- 1. Packaged Roof Top Heating/Cooling Units
  - 2. Air Inlets and Outlets

### 3.12 MINIMUM DATA TO BE REPORTED

- A. Items:
- 1. Fan Data:
    - a. System identification.
    - b. Location.
    - c. Make and type.
    - d. Model number and size.
    - e. Manufacturer's serial number.
    - f. Arrangement and class.
    - g. Sheave make, size in inches, and bore.
    - h. Sheave dimensions, center-to-center, and amount of adjustments in inches.
  - 2. Electric Motors:
    - a. Manufacturer
    - b. Model/Frame
    - c. HP/BHP

- d. Phase, voltage, amperage; nameplate, actual, no load
- e. RPM
- f. Service factor
- g. Starter size, rating, heater elements
- h. Sheave Make/Size/Bore
- 3. Return Air/Outside Air:
  - a. Identification/location
  - b. Design air flow
  - c. Actual air flow
  - d. Design return air flow
  - e. Actual return air flow
  - f. Design outside air flow
  - g. Actual outside air flow
  - h. Return air temperature
  - i. Outside air temperature
  - j. Required mixed air temperature
  - k. Actual mixed air temperature
  - l. Design outside/return air ratio
  - m. Actual outside/return air ratio
- 4. Duct Leak Tests:
  - a. Description of ductwork under test
  - b. Duct design operating pressure
  - c. Duct design test static pressure
  - d. Duct capacity, air flow
  - e. Maximum allowable leakage duct capacity times leak factor
  - f. Test apparatus
    - 1) Blower
    - 2) Orifice, tube size
    - 3) Orifice size
    - 4) Calibrated
  - g. Test static pressure
  - h. Test orifice differential pressure
  - i. Leakage
- 5. Air Distribution Tests (diffusers, grills, registers):
  - a. Air terminal number
  - b. Room number/location
  - c. Terminal type

- d. Terminal size
- e. Area factor
- f. Design velocity
- g. Design air flow
- h. Test (final) velocity
- i. Test (final) air flow
- j. Percent of design air flow

**END OF SECTION**

## **SECTION 23 0713**

### **DUCT INSULATION**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Duct insulation.
- B. Insulation jackets.

##### **1.02 REFERENCE STANDARDS**

- A. ASTM C 518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C 553 - Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications.
- C. ASTM C 612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation.
- D. ASTM C 1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material).
- E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- F. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials.
- G. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association.
- H. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association.
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc..

##### **1.03 SUBMITTALS**

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures necessary to ensure acceptable workmanship and that installation standards will be achieved.

##### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section with not less than 10 years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section, with minimum 10 years of experience and approved by manufacturer.

##### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

##### **1.06 FIELD CONDITIONS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.



- B. Maintain temperature during and after installation for minimum period of 24 hours.

### **1.07 INSULATION OF EXISTING SYSTEMS**

- A. On renovation/addition projects where existing ductwork systems are being modified the existing ductwork systems shall be reinsulated as required to maintain sealed insulation/vapor barrier.
- B. After completion of any required asbestos abatement, reinsulate all existing systems.

## **PART 2 PRODUCTS**

### **2.01 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION**

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E 84, NFPA 255, or UL 723.
- B. Where insulation and covering is specified or required to include a vapor barrier, it is critical that the integrity of the vapor barrier is continuously maintained. Fasteners or other securing devices that may unintentionally penetrate, or damage, the vapor barrier are prohibited. Where fasteners must penetrate the vapor barrier, the vapor barrier shall be repaired.

### **2.02 GLASS FIBER, FLEXIBLE (EXTERIOR DUCT WRAP)**

- A. Manufacturer:
  - 1. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
  - 4. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
- B. Insulation: ASTM C 553; flexible, noncombustible blanket.
  - 1. 'K' value: 0.29 at 75 degrees F, when tested in accordance with ASTM C 518.
  - 2. Maximum Service Temperature: 450 degrees F.
  - 3. Maximum Water Vapor Sorption: 5.0 percent by weight.
  - 4. Maximum Density: 1.5 lb./cu ft.
- C. Vapor Barrier Jacket:
  - 1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  - 2. Moisture Vapor Permeability: 0.058 ng/Pa s m (0.04 perm inch), when tested in accordance with ASTM E 96/E 96M.
  - 3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive. The use of duct tape is prohibited.
- E. Outdoor Vapor Barrier Mastic:
  - 1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- F. Tie Wire: Annealed steel, 16 gage.

### **2.03 GLASS FIBER, RIGID (EXTERIOR BOARD DUCT INSULATION)**

- A. Manufacturer:
  - 1. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).

3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
4. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
- B. Insulation: ASTM C 612; rigid, noncombustible blanket.
  1. 'K' value: 0.31 at 75 degrees F, when tested in accordance with ASTM C 518.
  2. Maximum service temperature: 450 degrees F.
  3. Maximum Water Vapor Sorption: 5.0 percent.
  4. Maximum Density: 3.0 lb./cu ft.
- C. Vapor Barrier Jacket:
  1. Kraft paper with glass fiber yarn and bonded to aluminized film.
  2. Moisture Vapor Permeability: 0.058 ng/Pa s m (0.04 perm inch), when tested in accordance with ASTM E 96/E 96M.
  3. Secure with pressure sensitive tape.
- D. Vapor Barrier Tape:
  1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive. The use of duct tape is prohibited.
- E. Indoor Vapor Barrier Finish:
  1. Vinyl emulsion type acrylic, compatible with insulation, white color.
- F. Outdoor Vapor Barrier Mastic:
  1. Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.

## 2.05 JACKETS

- A. 13-Ply Laminate Jacket System.
  1. Laminate jacket system with zero permeability, absolute vapor barrier for insulation cladding/jacketing applications.
    - a. Thickness: 15.5 mils (PSTC-133)
    - b. Tensile Strength: 160 lbs./in width (PSTC -131)
    - c. Puncture Resistance: 80 lb. (ASTM D 1000)
    - d. Tear Strength: 16 lb. (ASTM D 624)
    - e. Application Temperature Range: -10 Deg F to 248 Deg F
    - f. Flame Spread/Smoke Developed: 50/75 (UL 723)
    - g. Water Vapor Permeability: 0.000 perms (ATSM E 96)
  2. Product: VentureClad 1579CW.
    - a. Finish:
      - 1) Natural Aluminum Embossed (1579CW-E)

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that ducts have been tested before applying insulation materials.
- B. Verify that surfaces are clean, foreign material removed, and dry.

### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Insulated ducts conveying air below ambient temperature:
  - 1. Provide insulation with vapor barrier jackets.
  - 2. Finish with tape and vapor barrier jacket.
  - 3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
  - 4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- D. Insulated ducts conveying air above ambient temperature:
  - 1. Provide with standard vapor barrier jacket.
  - 2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.
  - 3. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.
- E. Ducts Exposed in Finished Spaces: Insulate with rigid glass fiber insulation and finish with canvas jacket sized for finish painting or aluminum jacket. Refer to specification section 09900 - Coordinate color with Architect.
- F. Exterior Applications (exposed to weather): Provide insulation of thickness scheduled with outdoor vapor barrier mastic. Cover with 13-Ply Laminate Jacket System (VentureClad 1579CW) with weatherproof caulked joints and seems located on bottom side of horizontal sections.
- G. External Duct Insulation Application:
  - 1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
  - 2. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
  - 3. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
  - 4. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.
  - 5. Continue insulation through wall penetrations using rigid fiberglass insulation 6 inches on either side of wall.

### 3.03 SCHEDULES

- A. Supply Air Ducts:
  - 1. Flexible Glass Fiber Duct Insulation: 1.5 inches thick.
  - 2. Rigid Glass Fiber Duct Insulation: 1.5 inches thick.
- B. Ductwork passing through walls (6 inches on either side of wall):
  - 1. Rigid Glass Fiber Duct Insulation: 1.5 inches thick.
- C. All Ducts Exposed to Outdoors or Outdoor Air Temperatures (i.e. Outdoors, Attics, Soffits, or Crawlspace):
  - 1. Rigid Glass Fiber Duct Insulation: 3 inches thick (Minimum R-8 installed).

2. Ducts exposed to the outdoors/elements shall be jacketed with a Laminate Jacketing system:
  - a. 13-ply laminate jacket system (VentruClad #1579CW).

**END OF SECTION**

## **SECTION 23 3100**

### **HVAC DUCTS AND CASINGS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Metal ductwork.

##### **1.02 REFERENCE STANDARDS**

- A. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel.
- B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association.
- D. NFPA 90B - Standard for the Installation of Warm Air Heating and Air Conditioning Systems; National Fire Protection Association.
- E. NFPA 96 - Standard for Ventilation Control and Fire Protection of Commercial Cooking Operations; National Fire Protection Association.
- F. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual; Sheet Metal and Air Conditioning Contractors' National Association.
- G. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association.

##### **1.03 SUBMITTALS**

- A. Product Data: Provide data for duct materials and duct connections.
- B. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual.
- C. Project Record Documents: Record actual locations of ducts and duct fittings. Record changes in fitting location and type. Show additional fittings used.

##### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum 10 years of documented experience.
- B. Installer Qualifications: Company specializing in performing the type of work specified in this section, with minimum 10 years of documented experience.

##### **1.05 REGULATORY REQUIREMENTS**

- A. Construct ductwork to NFPA 90A, NFPA 90B, and NFPA 96 standards.

##### **1.06 FIELD CONDITIONS**

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.
- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

##### **1.07 COORDINATION REQUIREMENTS**

- A. Sheet metal trades shall coordinate all design, construction, and installation with all other trades.
- B. Sheet metal trades shall cooperate with the Test and Balance Contractor and provide all miscellaneous caps and any other materials required for structural integrity and leakage testing

of the complete ductwork system. Refer to Test and Balance specification section.

- C. Coordinate painting requirements of exposed ductwork in finished areas with specification section 09900 and color with Architect.

## **1.08 DESIGN REQUIREMENTS**

- A. Duct sizes shown on drawings are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- B. No variation of duct configuration or sizes permitted except by written permission. Size round ducts installed in place of rectangular ducts in accordance with ASHRAE table of equivalent rectangular and round ducts.
- C. Use material, weight, thickness, gauge, construction and installation methods as outlined in the latest addition of the following SMACNA publications, unless noted otherwise:
  - 1. HVAC Duct Construction Standards, Metal and Flexible
  - 2. HVAC Air Duct Leakage Test Manual
  - 3. HVAC Systems - Duct Design
  - 4. Rectangular Industrial Duct Construction
  - 5. Round Industrial Duct Construction
- D. Use products which conform to NFPA 90A, possessing a flame spread rating of less than 25 and a smoke developed rating of less than 50.

## **1.09 PRESSURE DEFINITIONS**

- A. Low Pressure Ductwork: Up to 2 inches WG and velocities less than 1,500 fpm. Construct for 2 inch WG positive and negative or positive static pressures.

# **PART 2 PRODUCTS**

## **2.01 DUCT ASSEMBLIES**

- A. All Ducts: Galvanized steel, unless otherwise indicated.
- B. Low Pressure Supply (Heating Systems): 2 inch w.g. pressure class, galvanized steel.
- C. Low Pressure Supply (System with Cooling Coils): 2 inch w.g. pressure class, galvanized steel.
- D. Return and Relief: 2 inch w.g. pressure class, galvanized steel.

## **2.02 MATERIALS**

- A. General: Non-combustible ducts, conforming to Class 1 air duct materials, or UL 181.
- B. Galvanized Steel Ducts: ASTM A 653/A 653M galvanized steel sheet, Forming Steel (FS) designation, with G90/Z275 zinc coating.
  - 1. Gaskets: Chloroprene elastomer, 40 Durometer, 1/8 inch thick, full face, one piece vulcanized or dovetail at joints.
  - 2. All reinforcement for ducts having a side dimension 48" or less shall be external. Internal reinforcement shall be acceptable only for ducts having a side dimension greater than 48 inches. Reinforcement shall be provided per SMACNA standards.
- C. Steel Ducts - Galvanized Round and Flat Oval Spiral: Galvanized sheet steel duct and fittings, lock forming quality per ASTM A527, Coating Designation G-90, factory fabricated, lock seam or welded design in accordance with SMACNA HVAC Duct Construction Standards or SMACNA Industrial Duct Construction Standards as required based on pressure class. Flat oval and round fittings shall be factory fabricated welded design. Use of field fabricated fittings (welded design) shall only be permitted when factory fabricated fittings are unavailable.



1. Manufacturers:
  - a. Dixi-Bilt.
  - b. Semco.
  - c. LaPine Metal Products.
  - d. United-McGill.
  - e. Univarsal Spiral Air.
- D. Insulated Flexible Ducts, Low and Medium Pressure:
  1. Flexible Ducts: Interlocking spiral of galvanized steel or aluminum construction or fabric supported helically wound spring steel wire or flat steel bands; rated to 6 inches WG positive and 4 inches negative for low and medium pressure ducts.
  2. Insulated Flexible Ducts: Flexible duct wrapped with flexible fiber glass insulation, enclosed in a fire retardant polyethylene vapor barrier jacket; maximum 0.23 K value at 75 deg F.
  3. Acoustical performance tested in accordance with the Air Diffusion Council's "Flexible Air Duct Test Code FD 72-R1."
  4. Flexible Duct Fittings: Galvanized steel, twist in design with damper.
  5. Manufacturer's:
    - a. Flexmaster Type 8M, UL 181, Class 1.
    - b. Automation Industries Thermaflex.
    - c. Hart & Cooley.
- E. Caulk: Elastomer caulk, UL listed and per NFPA 90A.
- F. Zinc Paint:
  1. Manufacturers:
    - a. Carboline "Galvanox No. 1."
    - b. Tnemec.
    - c. Welco "Cold Galv."
- G. Heat Shrinkable Sealant: Heat shrinkable polyethylene bands with heat softening epoxy for round slip fit duct joints. For use on all round seal Class A joints with exception of polyvinyl chloride coated ductwork.
- H. Sealant: Indoor/outdoor water based duct sealant. UL listed, non-toxic, water resistant, 0 smoke/flame spread, compatible with mating materials, for use on all SMACNA seal Class A, B, and C joints, for use on 1/2 - 10" wg SMACNA pressure classes. Use PCD duct sealer on PVC coated steel ductwork.
  1. Manufacturers:
    - a. Hardcast "Duct-Seal #321"
    - b. Foremost "PCD Duct Sealer"
- I. Reinforcing and Supports:
  1. Except as otherwise indicated, provide hot-dipped galvanized steel fasteners, anchors, rods, straps, trim, and angles for support of ductwork.
  2. Welded reinforcement and supports shall be structural steel black iron painted with zinc rich paint.
  3. Screwed type and supports shall be structural steel per ASTM A36; Mill galvanized steel per

ASTM A123. Fabricated sheet steel per ASTM A527, coating designation G-90.

4. Flanges in contact with the airstream shall be of the same material as the ductwork.
  5. Bolts and fasteners for galvanized steel duct work shall be carbon steel, zinc coated per ASTM A153. Bolts and fasteners for stainless steel and PVC coated steel duct shall be stainless steel.
  6. All nonmetal ductwork shall be adequately supported by means of a fiberglass or PVC-coated hanger, straps, or steel rods.
  7. All hangers shall provide a means of vertical adjustment after erection.
- J. Hanger Rod: ASTM A 36/A 36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

## **2.03 DUCTWORK FABRICATION**

- A. Low Pressure Ductwork (+/- 2 " W.G. Static Pressure Class)
1. Fabricate and support in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.
- C. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
1. Use double nuts and lock washers on threaded rod supports.
  2. Where ducts are connected to exterior wall louvers and duct outlet is smaller than louver frame, provide blank-out panels sealing louver area around duct. Use same material as duct, painted black on exterior side; seal to louver frame and duct.

## **2.04 DUCT MANUFACTURERS**

- A. Metal-Fab, Inc.
- B. Semco, Inc.
- C. United McGill Corporation.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install, support, and seal ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- B. Install in accordance with manufacturer's instructions.
- C. Flexible Ducts: Connect to metal ducts with liquid adhesive plus tape.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Install and seal metal and flexible ducts in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible.
- F. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- G. Locate ducts with sufficient space around equipment to allow normal operating and maintenance

activities.

- H. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- I. Use double nuts and lock washers on threaded rod supports.
- J. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.
- K. Provide flexible duct connections where ductwork connects to fans, air handling equipment, and other rotating equipment and/or where indicated on the drawings.
- L. Where ducts pass through fire rated walls or floor dividing conditioned spaces from unconditioned spaces, provide a flanged duct-segment for installation during the time of construction to provide a tight seal.
- M. Where ducts pass through walls and floors, finish wall openings with metal trim strips and curb floor openings. Wood frames are not permitted.
- N. Install airfoil turning vanes in all rectangular mitered elbows, whether indicated on drawings or not.

### **3.02 DUCTWORK FABRICATION**

- A. Verify dimensions at the site, making field measurements and drawings necessary for fabrication and erection. Check plans showing work of other trades and consult with Architect and/or Engineer in the event of any interferences.
- B. Fabricate necessary offsets and transitions to avoid interference with building construction, piping, equipment, etc. Make changes, offsets, etc. for duct obstructions per SMACNA HVAC Duct Construction Standards or SMACNA Industrial Duct Construction Standards as required based upon pressure class. However, do not reduce duct to less than 6 inches in any dimension and do not exceed an 8:1 aspect ratio. Where it is necessary to take pipes, beams, or other similar obstructions through ducts, construct easement as indicated in SMACNA HVAC Duct Construction Standards or SMACNA Industrial Duct Construction Standards. In all cases, seal to prevent air leakage.
- C. Fabricate ductwork to prevent failure under pressure or vacuum created by fast closure of ductwork devices. Provide leaktight automatic relief devices where required.
- D. Ducts or plenums of masonry construction are not acceptable.
- E. Repair galvanized surfaces damaged by the application of zinc rich paint per manufacturer's instructions.

### **3.03 DUCT LEAKAGE**

- A. The maximum allowable total leakage rate for duct systems shall be 5% of their associated fan and/or air handling unit CFM.

### **3.04 CLEANING**

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

### **3.05 PAINTING**

- A. All ductwork exposed in finished areas (insulated and/or uninsulated) shall be painted to match the surrounding finishes. Refer to specification section 09900 - Coordinate color with Architect.

## **END OF SECTION**

## **SECTION 23 3300**

### **AIR DUCT ACCESSORIES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Air turning devices/extractors.
- B. Duct test holes.
- C. Flexible duct connections.
- D. Volume control dampers.

##### **1.02 REFERENCE STANDARDS**

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; National Fire Protection Association.
- B. NFPA 92A - Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences.
- C. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association.
- D. UL 33 - Heat Responsive Links for Fire-Protection Service; Underwriters Laboratories Inc..
- E. UL 555 - Standard for Fire Dampers; Underwriters Laboratories Inc..
- F. UL 555S - Standard for Leakage Rated Dampers for Use in Smoke Control Systems; Underwriters Laboratories Inc..

##### **1.03 SUBMITTALS**

- A. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.
- B. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers, duct access doors, and duct test holes.
- C. Manufacturer's Installation Instructions: Provide instructions for fire dampers and combination fire and smoke dampers.

##### **1.04 PROJECT RECORD DOCUMENTS**

- A. Record actual locations of access doors and test holes.

##### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum 10 years of documented experience.

##### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect dampers from damage to operating linkages and blades.
- B. Handling: Handle and lift dampers in accordance with manufacturer's instructions. Protect materials and finishes during handling and installation to prevent damage.

#### **PART 2 PRODUCTS**

##### **2.01 AIR TURNING DEVICES/EXTRACTORS**

- A. Manufacturers:
  - 1. Krueger: [www.krueger-hvac.com](http://www.krueger-hvac.com).

2. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
  3. Titus: [www.titus-hvac.com](http://www.titus-hvac.com).
  4. Nailor.
- B. Multi-blade device with blades aligned in short dimension; steel or aluminum construction; with individually adjustable blades, mounting straps.

## **2.02 BACKDRAFT DAMPERS**

- A. Manufacturers:
1. Louvers & Dampers, Inc.: [www.louvers-dampers.com](http://www.louvers-dampers.com).
  2. Nailor Industries Inc.: [www.nailor.com](http://www.nailor.com).
  3. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
  4. Greenheck.
  5. Air Balance Inc.
- B. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: galvanized steel or extruded aluminum, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

## **2.03 DUCT TEST HOLES**

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.
- B. Permanent Test Holes: Factory fabricated, air tight flanged fittings with screw cap. Provide extended neck fittings to clear insulation.

## **2.04 FLEXIBLE DUCT CONNECTIONS**

- A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- B. Flexible Duct Connections: Fabric crimped into metal edging strip.
1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz. per sq. yd.
    - a. Net Fabric Width: Approximately 3 inches wide.
  2. Metal: 3 inches wide, 24 gage thick galvanized steel.
- C. Manufacturers:
1. Ventfabrics, Inc. "Ventglas."
  2. Pathway.
  3. Duro-Dyne.

## **2.05 VOLUME CONTROL DAMPERS**

- A. Manufacturers:
1. Louvers & Dampers, Inc.: [www.louvers-dampers.com](http://www.louvers-dampers.com).
  2. Nailor Industries Inc.: [www.nailor.com](http://www.nailor.com).
  3. Ruskin Company: [www.ruskin.com](http://www.ruskin.com).
  4. American Warming and Ventilating Inc.
  5. Greenheck.

6. NCA Manufacturing.
7. Air Balance Inc.
- B. Fabricate in accordance with SMACNA HVAC Duct Construction Standards - Metal and Flexible, and as indicated.
- C. Single Blade Dampers: Fabricate for duct sizes up to 6 x 30 inch.
- D. End Bearings: Except in round ducts 6 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon or sintered bronze bearing.
- E. Quadrants:
  1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
  2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
  3. Where rod lengths exceed 30 inches provide regulator at both ends.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Verify that electric power is available and of the correct characteristics.
- B. Coordinate installation of automatic control dampers provided by controls sub-contractor.
- C. Examine areas to receive dampers. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization of dampers. Do not proceed with installation until unsatisfactory conditions are corrected.

### **3.02 INSTALLATION**

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA HVAC Duct Construction Standards - Metal and Flexible. Refer to Section 23 3100 for duct construction and pressure class.
- B. Provide duct test holes where indicated and required for testing and balancing purposes.
- C. At fans and motorized equipment associated with ducts, provide flexible duct connections immediately adjacent to the equipment.
- D. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

## **END OF SECTION**



## **SECTION 23 3700**

### **AIR OUTLETS AND INLETS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Diffusers.
- B. Registers/grilles.

##### **1.02 REFERENCE STANDARDS**

- A. ADC 1062: GRD - Test Code for Grilles, Registers & Diffusers; Air Diffusion Council.
- B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; Air Movement and Control Association International, Inc..
- C. ASHRAE Std 70 - Method of Testing for Rating the Performance of Air Outlets and Inlets; American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc..
- D. SMACNA (DCS) - HVAC Duct Construction Standards - Metal and Flexible; Sheet Metal and Air Conditioning Contractors' National Association.

##### **1.03 SUBMITTALS**

- A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, make, model, finish, location, air quantity, pressure drop, neck or jet velocity, throw, diffusion range, and noise level.
  - 1. Throw shall be the horizontal distance from the diffuser to the point where the theoretical centerline velocity is 50 feet per minute. The throw scheduled shall not exceed the horizontal distance between the diffuser and the nearest wall, or half the distance between ceiling diffusers.
  - 2. Identify diffusers using the designations used in the drawings and specifications.
  - 3. Sound data shall be given in terms of sound power level in octave bands 2 through 8, and NC index for the capacity range of the diffuser.
- B. Project Record Documents: Record actual locations of air outlets and inlets.

##### **1.04 QUALITY ASSURANCE**

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.

##### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum 10 years of documented experience.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Carnes Company HVAC: [www.carnes.com](http://www.carnes.com).
- B. Krueger: [www.krueger-hvac.com](http://www.krueger-hvac.com).
- C. Price Industries: [www.price-hvac.com](http://www.price-hvac.com).
- D. Titus: [www.titus-hvac.com](http://www.titus-hvac.com).

- E. Nailor.
- F. Tuttle & Bailey.

## **2.02 DIFFUSERS, REGISTERS, AND GRILLS - GENERAL**

- A. Refer to schedules on drawings for quantities, types, finishes, and manufacturer's model numbers of diffusion devices.
- B. Air diffusion devices have been chosen in terms of specific air distribution requirements, spacing, and sound characteristics. Provide ADC certified manufacturer's standard devices.
- C. Provide plaster frames for diffusers installed in plaster ceilings.
- D. Install wall mounted supply registers six (6) inches below ceiling, unless noted otherwise.
- E. Diffusers shall be standard off-white baked enamel finish, unless noted otherwise. Contractors shall coordinate diffuser colors with architect prior to ordering. Provide air diffusion device interior surfaces, including blank-offs, with black matte finish.
- F. Coordinate frame types with architectural reflected ceiling plan.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.
- C. Install diffusers to ductwork with air tight connection.
- D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

## **END OF SECTION**

## **SECTION 23 7413**

### **PACKAGED OUTDOOR AIR-HANDLING UNITS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Packaged outdoor air conditioning unit, rooftop or grade mounted.
- B. Unit controls.

##### **1.02 REFERENCE STANDARDS**

- A. AHRI 210/240 - Standard for Performance Rating of Unitary Air Conditioning and Air-Source Heat Pump Equipment; Air-Conditioning, Heating, and Refrigeration Institute.
- B. AHRI 270 - Sound Rating of Outdoor Unitary Equipment; Air-Conditioning, Heating, and Refrigeration Institute.
- C. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilation Systems; National Fire Protection Association.

##### **1.03 SUBMITTALS**

- A. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- B. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
- C. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in OWNER's name and registered with manufacturer.

##### **1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum 10 years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- C. Units shall be rated in accordance with ARI Standards 210/240 or 360 and 270.
- D. Units shall be UL tested and certified in accordance with ANSI Z21.47 Standard and UL listed.
- E. Insulation and adhesive shall meet NFPA 90A requirements for flame spread and smoke generation.

##### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

##### **1.06 WARRANTY**

- A. Provide a five year warranty to include coverage for refrigeration compressors.

**1.078 EXTRA MATERIALS**

- A. Provide one set of filters.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Carrier Corporation: [www.carrier.com](http://www.carrier.com)
- B. Trane Inc.: [www.trane.com](http://www.trane.com).
- C. York International Corporation/Johnson Controls: [www.york.com](http://www.york.com).

**2.02 AIR CONDITIONING UNITS**

- A. General: Roof mounted, or grade mounted, units having gas burner and electric refrigeration.
- B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heat exchanger and burner, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.
- C. Electrical Characteristics:
  - 1. Refer to Section 26 2717.
- D. Disconnect Switch: Factory mount disconnect switch in control panel.

**2.03 FABRICATION**

- A. General:
  - 1. Furnish packaged rooftop air handling units, factory fabricated and assembled, including components and auxiliaries as indicated and specified elsewhere and herein. Units shall conform to ANSI/UL 465.
  - 2. Unit(s) shall have factory labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
- B. Cabinet: Galvanized steel with baked enamel finish, including access doors with piano hinges and locking handle. Structural members shall be minimum 18 gage, with access doors or panels of minimum 20 gage.
- C. Insulation: one inch thick neoprene coated glass fiber with edges protected from erosion.
- D. Heat Exchangers: Stainless steel.
- E. Supply Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch motor pulley, and rubber isolated hinge mounted high efficiency motor. Isolate complete fan assembly. Refer to Section 22 0548.
- F. Air Filters: 2 inch thick glass fiber disposable media in metal frames. Air filters shall mount integral within the casing and be accessible via hinged access panels.
- G. Filter section shall only use one filter size.
- H. Roof Mounting Curb: 24 inches high galvanized steel, channel frame with gaskets, nailer strips.

**2.04 EVAPORATOR FAN**

- A. Indoor blower (evaporator fan) shall be of the belt driven, double inlet, forward curved centrifugal type. Belt drive shall include an adjustable-pitch motor pulley. The fan shall be made of steel with a corrosion resistant finish and shall be dynamically balanced.
- B. Bearings shall be of the sealed, permanently lubricated, ball bearing type for longer life and lower maintenance.

**2.05 BURNER**

- A. Gas Burner: Induced draft type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.
- B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.
- C. Redundant main gas valve and two stage heat.
- D. High Limit Control: Temperature sensor with fixed stop at maximum permissible setting, de-energize burner on excessive bonnet temperature and energize burner when temperature drops to lower safe value.
- E. Supply Fan Control: Temperature sensor sensing bonnet temperatures and independent of burner controls, with provisions for continuous fan operation.

**2.06 EVAPORATOR COIL**

- A. Provide copper tube aluminum fin coil assembly with non-corrosive drain pan and drain connection.
- B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.
- C. Unit shall have standard thru-the-bottom drain connection capability.

**2.07 COMPRESSOR**

- A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.
- B. Factory rubber-shock mounted and internally spring mounted.
- C. Five minute timed off circuit to delay compressor start.
- D. Provide step capacity control by cycling compressors.

**2.08 CONDENSER COIL**

- A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.
- B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.
- C. Provide refrigerant pressure switches to cycle condenser fans.
- D. Provide low ambient control package consisting of a condenser coil temperature sensor to maintain condensing temperature between 90 degree F and 110 degree F at outdoor ambient temperatures down to -20 degree F by condenser speed modulation or condenser fan cycling.

**2.09 ECONOMIZER**

- A. Integrated Economizer: Integral-modulating type capable of simultaneous economizer and compressor operation. Capable of introducing 100% outdoor air in both minimum and fully open positions. Equipped with a barometric relief damper with up to 100% return air relief. Designed to close damper during power outage or spring return built into motor. Dry bulb outdoor air thermostat protection shall be provided.
- B. Enthalpy Control: Capable of sensing outdoor-air enthalpy content and controlling the economizer cut-in point to have minimum heat content air passing over the evaporator coil for most efficient system operation.

- C. Gaskets: Provide tight fitting dampers with edge gaskets maximum leakage 5 percent at 2 inches pressure differential.

## **2.10 ACCESSORIES**

- A. Provide fan/filter status switch. Provides status of evaporator fan (on/off) or indoor air filter (clean/dirty). Status shall be displayed over the communication bus when used with direct digital controls or with an indicator light at the thermostat.

## **2.11 OPERATING CONTROLS - SINGLE ZONE UNITS**

- A. Electric solid state microcomputer based room thermostat, located as indicated.
- B. Room thermostat shall incorporate:
  - 1. Automatic switching from heating to cooling.
  - 2. Preferential rate control to minimize overshoot and deviation from set point.
  - 3. Set-up for four separate temperatures per day.
  - 4. Instant override of set point for continuous or timed period from one hour to 31 days.
  - 5. Short cycle protection.
  - 6. Programming based on weekdays, Saturday and Sunday.
  - 7. Switch selection features including imperial or metric display, 12 or 24 hour clock, keyboard disable, remote sensor, fan on-auto.
- C. Room thermostat display shall include:
  - 1. Time of day.
  - 2. Actual room temperature.
  - 3. Programmed temperature.
  - 4. Programmed time.
  - 5. Day of week.
  - 6. System model indication: heating, cooling, auto, off, fan auto, fan on.
  - 7. Stage (heating or cooling) operation.
- D. Provide low limit thermostat in supply air to close outside air dampers and stop supply fan.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 90A.
- C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

### **3.02 SYSTEM STARTUP**

- A. Prepare and start equipment. Adjust for proper operation.
- B. Manufacturer shall provide factory trained personnel to assist with startup and Owner training.

## **END OF SECTION**

## **SECTION 26 0001**

### **GENERAL ELECTRICAL REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.01 DESCRIPTION OF WORK**

- A. This Division includes all labor, materials, equipment, tools, supervision, start-up services, Owner's Instructions, including all incidental and related items necessary to complete installation and successfully test and start up and operate the Electrical Systems indicated on Drawings and described in each Section of Division 26 Specifications, AND applicable Division 27 Specifications, AND applicable Division 28 Specifications, and conforming with ALL other Contract Documents.
- B. The Drawings and General Provisions of the Contract, including the General Conditions, Supplementary General Conditions, and Division 1 specification sections, apply to work of Division 26 sections. The items in this section are not intended to supersede, but are supplementary to, the requirements set forth in other Divisions of the specifications.
- C. The Contractor, and his Subcontractors and Suppliers, shall include in their bid all materials, labor, and equipment involved, in accordance with all local customs, codes, rules, regulations; and secure compliance of all parts of the Specifications and Drawings regardless of Sectional inclusion in these Specifications.
- D. The Contractor shall be held responsible for the complete and satisfactory accomplishment of all Work inclusive of whatever miscellaneous material and/or appurtenances are required to perfect the installation, and demonstrate that all electrical systems will operate satisfactorily under normal operating conditions.

##### **1.02 DRAWINGS & SPECIFICATIONS**

- A. The drawings are diagrammatic and show the general location and arrangement of equipment, outlets, lights and related electrical items. They shall be followed as closely as elements of the construction will permit. The Contractor shall provide/install all electrical systems, and associated equipment, complete and include all necessary wire/conduit, pull boxes, and other components required due to interferences, space constraints, code requirements, etc. as required to provide a complete/functional system.
- B. These General Electrical Requirements are intended to augment the drawings and specifications. Should conflicts occur between the drawings and the specifications, the strictest provision shall govern. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect and/or Engineer for resolution.
- C. The Contractor shall examine the drawings of all other trades in order to verify the conditions governing the work on the job site. Arrange work accordingly, providing all wiring, conduit, fittings, boxes, etc. as may be required to meet such conditions.
- D. Deviations from the drawings, with the exception of minor changes in routing and other such incidental changes that do not affect the functioning or serviceability of the systems, shall not be made without the written approval of the Architect and/or Engineer.
- E. The architectural and structural drawings take precedence in all matters pertaining to the building structure, mechanical drawings in all matters pertaining to mechanical trades and electrical drawings in all matters pertaining to electrical trades. Where there are conflicts or differences between the drawings for the various trades, report such conflicts or differences to the Architect and/or Engineer for resolution.



**1.03 COORDINATION OF WORK**

- A. The Contractor shall verify clearance requirements of all electrical and mechanical equipment/systems prior to the installation of any new work. Electrical equipment, wiring, systems, etc. shall not interfere with mechanical equipment spaces. The Contractor shall coordinate his work to obtain symmetry in ceiling layouts, so that sprinkler heads, lights, diffusers, etc. are coordinated and are installed per the Architectural reflected ceiling plan.
- B. The Contractor, and his Subcontractors, shall be responsible for all tasks applicable to their work in accordance with the Specifications, Drawings, and code requirements, and shall be responsible for coordinating locations and arrangements of their work to give best results with all other relevant trades.
  - 1. Coordinate his work to obtain symmetry in ceiling layouts, so that sprinkler heads, lights, diffusers, etc. are coordinated and are installed per the Architectural reflected ceiling plan.
  - 2. Coordinate all wall, roof, floor penetrations, equipment pads, equipment locations, system routings, etc. with architectural and structural trades.
  - 3. Verify requirements of all equipment with shop drawing submittals prior to installation - notify Architect/Engineer of any conflicts between shop drawings and plans.
  - 4. Coordinate rough-in locations and mounting heights of all devices with locations/heights of countertops/sinks/furniture/cabinets/etc. with Architectural Elevations and other trades prior to rough-in.
  - 5. Coordinate rough-in locations of mechanical control devices (i.e. thermostats, sensors, etc.) with mechanical trades. E.C shall provide rough-in of box for T-stat/Sensor and conduit pathway from box to mechanical unit's control box, for wiring by M.C and/or T.C.. T-stats shall be located @ 48" AFF unless noted otherwise.
  - 6. Coordinate locations of electrical items that require access (i.e. panelboards, starters, pull boxes, etc.) with reflected ceiling plan. Items located above hard non-accessible ceilings shall be provided with access doors as required.
  - 7. Do not route/locate below grade conduits below, or with 45 degrees of the bottom corner of, foundation walls/footings. Coordinate with structural trades prior to rough-in.
  - 8. Verify clearance requirements of all electrical and mechanical equipment/systems prior to the installation of any new work. Electrical equipment, lighting, conduit, systems, etc. shall not interfere with mechanical equipment spaces. Mechanical equipment, piping, ductwork, systems, etc. shall not interfere with electrical equipment spaces.

**1.04 INSPECTION OF SITE AND PROJECT DOCUMENTATION**

- A. The Contractor shall visit the site and examine/verify the conditions under which the work must be conducted before submitting proposal. The Contractor shall examine the drawings and specifications of all other trades including Mechanical, Architectural, Structural, Plumbing, and Electrical.
- B. The submitting of a proposal implies that the Contractor has visited the site, examined all contract documents, and understands the conditions under which the work must be conducted.
- C. The Contractor shall notify the Architect and/or Engineer, via written RFI prior to submitting his bid, of any potential conflicts/problems with the plans that he has identified during his inspection of the site and/or from the review of plans/specifications. RFIs must be submitted at least 5 working days prior to bid opening.

**1.05 GENERAL SUPPORT REQUIREMENTS**

- A. Provide all necessary angle/brackets or supplementary steel as required for adequate support for all conduit, lighting, specialties, and equipment. Secure approval from Architect and/or Structural Engineer, in writing, before welding or bolting to steel framing or anchoring to concrete structure, or cutting/coring thru structural systems.

- B. Where conduit or equipment is supported or suspended from concrete construction, provide approved concrete inserts in formwork to receive hanger rods, such as Unistrut or Powerstrut, and where installed in metal deck, use Ramset or Welds as required.

#### **1.06 GUARANTEE**

- A. Contractor shall guarantee that all labor, materials, and equipment are free from defects and agrees to replace or repair any part of this installation which becomes defective within a period of one year from the date of substantial completion following final acceptance, provided that such failure is due to defects in the equipment, material or installation. Acceptance date of substantial completion shall be Owner occupancy as determined by the Architect and/or Engineer.
- B. The Contractor shall file with the Owner one set of guarantees from the equipment manufacturers including the operating conditions and performance capacities they are based on.

#### **1.07 CODES, PERMITS AND FEES**

- A. Refer to Division 1, General Requirements and Supplementary Conditions.
- B. Unless otherwise indicated, all required permits, plan reviews, licenses, inspections, approvals and fees for electrical work shall be secured and paid for by the Contractor.
- C. All work shall be executed in accordance with the latest enforceable rules and regulations set forth in local and state codes.
  - 1. Electrical systems shall be installed per current jurisdictional codes (National Electrical Code, International Energy Code, etc.), current NFPA codes (NFPA 101, NFPA 90, NFPA 72, etc.), and applicable sections of the International Building Code.
- D. In the event that the plans and specifications conflict with any rules, regulations, or codes applying, said rules, regulations and codes shall govern.
- E. Where the drawings and/or specifications indicate materials or construction in excess of code requirements, the drawings and/or specifications shall govern.
- F. Contractor shall prepare any detailed drawings or diagrams which may be required by the governing authorities (i.e. fire alarm plans, lighting layouts, etc.).

#### **1.08 SUBSTITUTION ITEMS REQUIRING PRIOR APPROVAL**

- A. All items that the Contractor proposes to use in the work, that are not specifically named in the contract documents, must be submitted for review/approval. Such items must be submitted in duplicate to the Architect and/or Engineer for approval a minimum of ten (10) days prior to bid opening. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.
- B. Lighting Substitutions:
  - 1. Furnish lighting fixtures as scheduled on drawings.
  - 2. Lighting fixture substitutions may be considered for approval by the Architect and/or Engineer only if all of the following criteria are met:
    - a. Provide specification cut sheets marked-up to clearly identify the proposed luminaire including features, options, accessories, etc. required to match products indicated in the schedules.
    - b. Submit all cut sheets, calculations, etc. to the Architect and/or Engineer no less than 7 days prior to bid date. Substitutions submitted after this date will not be considered.

**1.09 MATERIAL AND EQUIPMENT MANUFACTURERS**

- A. All items of equipment shall be furnished complete with all accessories normally supplied with the catalog items listed and all other accessories necessary for a complete and satisfactory operating system. All equipment and materials shall be new and shall be standard products of manufacturers regularly engaged in the production of electrical equipment and shall be the manufacturer's latest design.
- B. If equipment by an approved manufacture is other than the equipment specified as the basis of design the substituted equipment shall be equal in quality, durability, appearance, capacity and efficiency through all ranges of operation, shall conform with arrangements and space limitations of the equipment shown on the plans and/or specified, shall be compatible with the other components of the system and shall comply with the requirements for Substitution Items Requiring Prior Approval specified in this Section of the Specifications. All costs to make these items of equipment comply with original requirements including, but not limited to, conduit, wiring, bus work, enclosures, and building alterations shall be included in the original bid.

**1.10 SHOP DRAWINGS**

- A. Refer to Division 1, General Requirements.
- B. All shop drawings shall be submitted in groupings by specification section (i.e. 262416-Panelboards, 262726-Wiring Devices, etc.) and of similar and/or related items. Incomplete submittal groupings will be returned unchecked.
- C. Unless noted otherwise, submit electronically in digital .pdf form, copies of complete manufacturer's shop drawings for all electrical equipment, or systems, including but not limited to, the items listed below. Where items are referred to by symbolic designation on the drawings and specifications, all submittals shall bear the same designation. Refer to other Sections of the electrical specifications for additional requirements.

26 0923 Lighting Control Devices

26 2416 Panelboards

26 2726 Wiring Devices

26 2818 Enclosed Switches

26 5100 Interior Lighting

26 5600 Exterior Lighting

28 3100 Fire Detection and Alarm

**1.11 OPERATION AND MAINTENANCE INSTRUCTIONAL MANUALS**

- A. Refer to Division 1, General Requirements.
- B. Provide complete maintenance and operating instructional manuals covering all electrical equipment as specified herein, and individual equipment specification sections.
- C. The O&M data shall be bound in a suitable number of 3" or 4", 3-ring, hard cover binders. Permanently imprinted on the cover shall be the words, "Manufacturer's Operation and Maintenance Data", project title, location of project, and the date. A table of contents shall be provided in the front of each binder.
- D. Maintenance and operating instructional manuals shall be job specific to this project. Generic manuals are not acceptable. Each piece of equipment in the O&M manual shall be identified as identified on the project drawings (i.e. Transformer T-1, Distribution Panel DP-1, etc.).
- E. Internally subdivide the binder contents with permanent page dividers, organized by specification section and/or major equipment/systems (i.e. Fire Alarm, Transformers, Distribution Equipment, Wiring Devices, etc.).

- F. Contents: Each volume of O&M manual shall have three parts:
1. Part 1: A directory listing names, addresses, and telephone numbers of Architect/Engineer, Contractor, Subcontractors, and major equipment suppliers.
  2. Part 2: O&M data, arranged and subdivided by major equipment/systems. For each category, identify names, addresses, and telephone numbers of Subcontractors and suppliers:
    - a. List of equipment.
    - b. Copies of Shop drawings and product data, approved by Architect/Engineer.
    - c. Installation and operational procedures.
    - d. Routine maintenance procedures.
    - e. Trouble shooting procedures.
    - f. Complete parts lists by nomenclature, manufacturer's part number and use.
    - g. Recommended spare parts lists.
    - h. Lubrication chart listing all types of lubricants to be used for each piece of equipment and the recommended frequency of lubrication.
    - i. Complete wiring and schematic diagrams.
    - j. Elevations and/or sections cut through all of the major equipment and sub-assemblies.
  3. Part 3: Project documents and certificates, including the following: Shop drawings.
    - a. Warranty certificates.
    - b. Copies of approved construction permits.
    - c. Contractor's and equipment manufacturer's telephone numbers for warranty repair services.
- G. Two (2) Maintenance and Operating manuals shall be provided to the Architect and/or Engineer for review when construction is 75% complete.
- H. A minimum of two (2) copies of all approved Operation and Maintenance literature shall be furnished to the Owner within 10 days after final inspection. O&M manuals must be completed prior to start of Owner training as the manuals shall be used as the basis of the training.

#### **1.12 INSTRUCTION OF OWNER PERSONNEL**

- A. Before final inspection the Contractor shall instruct Owner's designated personnel in operation, adjustment and maintenance of electrical equipment and systems at agreed upon times.
- B. For equipment requiring seasonal operation, perform instructions for other seasons within six months.
- C. Use Operation and Maintenance Manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

#### **1.13 RECORD DRAWINGS**

- A. Contractor shall submit to the Architect and/or Engineer, record drawings which have been neatly marked to represent as-built conditions for all new electrical work.
- B. The Contractor shall keep accurate note of all deviations from the construction documents and discrepancies in the concealed conditions and other items of construction on field drawings as they occur. Proper circuiting, conduit runs, location and number of electrical devices shall be

indicated on the "as-built" drawings. The marked up field documents shall be available for review by the Architect, Engineer and Owner at their request.

#### **1.14 UTILITIES**

- A. The Contractor shall be responsible for coordinating, obtaining service, and advising the Engineer, and utility company(s) for the electrical and telephone service installations.
- B. Rules of local utility companies shall be complied with. The Contractor shall check with each utility company supplying service to the installation (i.e. power, phone, data, cable) and coordinate service requirements including, but not limited to, all transformers, meter boxes and meters which will be required. The Contractor shall provide an allowance for all required utility costs in his bid.
- C. In the event that the plans and specifications conflict with any utility rules applying, said utility rules and regulations shall govern.

### **PART 2 PRODUCTS**

#### **2.01 MATERIALS**

- A. All material and equipment furnished and installed by the Contractor for the permanent Work shall be new, unused, of the best quality of make specified, shall be free from defects of any character, and shall be listed as approved by the UL and/or FM.
- B. Outdoor electrical equipment shall be weatherproof, NEMA 3R or NEMA 4X (stainless steel), unless otherwise indicated.
- C. Unless otherwise specified in other Division 26 sections, the sheet metal surfaces of equipment enclosures shall be coated with a rust resisting primer. Over the primer, a corrosion resistant baked enamel finish shall be applied. The color shall be ASA No. 49, medium light gray.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION OF EQUIPMENT**

- A. Install equipment in strict accordance with all directions and recommendations furnished by the manufacturer. Where such directions are in conflict with the drawings and specifications, report such conflicts to the Architect and/or Engineer for resolution.

#### **3.02 CHASE, SHAFTS AND RECESSES**

- A. Coordinate with architectural and other trades to ensure accurate location and size of chases, shafts and recesses.

#### **3.03 CUTTING, CORING AND PATCHING**

- A. Refer to General Conditions
- B. The Contractor shall perform all cutting, coring, and patching that may be necessary for the installation of their Work. All cutting, coring, patching and repair work shall be performed by the Contractor through qualified Subcontractors. Contractor shall include full cost of same in his bid.
- C. Secure approval from Architect and/or Structural Engineer, in writing, before cutting, welding/bolting to, or anchoring from any structural building components (i.e. structural steel, load bearing walls, footings/foundations, concrete floors/ceilings, etc.).

#### **3.04 EXCAVATION AND BACKFILLING**

- A. Provide all excavation, trenching, tunneling and backfilling required for the electrical work.
- B. Where conduit is installed less than 2'6" below the surface of pavement, provide concrete encasement, 4" minimum coverage, all around or as shown on the electrical drawings.
- C. Install warning tape for all buried circuits.

- D. Refer to Architectural, Structural, and Site/Civil Specification sections for excavation and backfilling details.

### **3.05 EQUIPMENT FOUNDATIONS AND SUPPORTS**

- A. Shall be as required for equipment mounting or as shown on plans.
- B. For equipment suspended from ceiling or walls, furnish and install all inserts, rods, structural steel frames, brackets and platforms required. Obtain approval of Architect and/or Structural Engineer for same including loads, locations, and methods of attachment.

### **3.06 SLEEVES**

- A. Provide and install Schedule 40 black steel pipe sleeves, cut to length, wherever conduits pass through above grade walls and floors. Provide and install galvanized steel pipe sleeves, cut to length, wherever conduits pass through below grade foundation walls and slab on grade floors. Sleeves shall terminate flush with walls in finished areas. All sleeves through the floor are to extend two (2) inches above finish floor.
- B. Provide escutcheons at each penetration through walls, floors, and ceilings in exposed areas.
- C. Patch sleeves to match building material.

### **3.07 SEALING OF ELECTRICAL OPENINGS**

- A. Seal the space around conduits in sleeves through walls, floors and ceilings.
- B. Provide adequate clearance to allow for proper sealing.
- C. Provide/install fireproof wall and floor sleeves as required at all applicable wall, ceiling, and floor penetrations. Refer to Architectural plans for wall assembly ratings.
- D. Sleeves placed in floors shall be flush with the underside of the floor construction and shall have planned, square ends, extending 2 inches above the finished floor, unless otherwise noted or detailed.
- E. Where sleeves pass through reinforced concrete floors, they shall be properly set in position prior to concrete pouring in such a way that they will be maintained in position until the concrete is set.
- F. Conduits passing through below grade perimeter walls or slabs on grade shall have the space between the pipe and sleeve sealed watertight with a mechanically expandable elastomer seal device.

### **3.08 FIRESTOP MATERIALS**

- A. Use only firestop products that have been tested according to ASTM E-814 and UL 1479 for the conditions set forth regarding construction assembly type, penetrating item type, annular space requirements and fire rating.
- B. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in other related specification sections.
  - 1. For non-combustible penetrations including conduit not passing through a sleeve, the following materials are acceptable:
    - a. Hilti FS 601 Elastmeric Firestop Sealant.
    - b. 3 M.
    - c. CSD Sealing Systems.
    - d. Firestop Systems.
  - 2. For non-combustible penetrations including sleeved conduits, the following materials are acceptable:

- a. Hilti FS 601 Elastmeric Firestop Sealant.
  - b. 3 M.
  - c. CSD Sealing Systems.
  - d. Firestop Systems.
3. For combustible penetrations including cables and cable bundles, the following materials are acceptable:
  - a. Hilti FS 611A Intumescent Firestop Sealant.
  - b. 3 M.
  - c. CSD Sealing Systems.
  - d. Firestop Systems.
4. For large or complex penetrations involving multiple conduits, cable trays, electrical busway, etc. the following materials are acceptable:
  - a. Hilti FS 635 Firestop Compound.
  - b. 3 M.
  - c. CSD Sealing Systems.
  - d. International Protective Coatings - KBS Sealbags.

### **3.09 EQUIPMENT CONNECTIONS**

- A. Make connections to equipment, fixtures and other items included in the work in accordance with the approved shop drawings and rough-in measurements furnished by the manufactures of the particular equipment furnished. All additional connections not shown on the drawings, but called out by the equipment manufacturer's shop drawings, shall be provided at no additional cost.

### **3.10 CLEANING**

- A. Each Trade shall be responsible for removing all debris daily as required to maintain the work area in a neat, orderly condition.
- B. Final cleanup shall include, but not be limited to, washing of fixture lenses or louvers, switchboards, substations, motor control centers, panels, etc. Fixture reflectors and lenses or louvers shall be left with no water marks or cleaning streaks.

### **3.11 PAINTING**

- A. All electrical systems, equipment, conduit, etc. exposed in finished areas shall be painted to match the surrounding finishes. Refer to specification section 09900 - Coordinate color with Architect

### **3.12 PROTECTION AND HANDLING OF EQUIPMENT AND MATERIALS**

- A. Equipment and materials shall be protected from theft, injury or damage.
- B. Protect equipment outlets, pipe and duct openings with temporary plugs or caps.
- C. Provide adequate storage for all equipment and materials delivered to the job site. Equipment set in place in unprotected areas must be provided with temporary protection.

### **3.13 ACCESSIBILITY**

- A. All equipment shall be installed so as to be readily accessible for operation, maintenance, and repair, as required by the equipment manufacturer and as subject to the approval of the Engineer.



**3.14 NAMEPLATES AND DIRECTORIES**

- A. Identify switchgear, unit substations, motor controls, panelboards, safety switches, etc., with manufacturer's nameplate, shop order, where applicable on composite assemblies, and designations used on the Drawings. Nameplates shall be laminated phenolic plastic, beveled edged white with engraved black letters. Except where impractical, letter and numerals shall be a minimum of 1/2 inch high. Nameplates shall be mechanically secured. Pressure sensitive nameplates are not acceptable. Panel directories shall be neatly typed, showing equipment served and location for each breaker or switch with a clear plastic protective cover.

**3.15 EXTRA WORK**

- A. Refer to Division 1, General Requirements.
- B. For any extra electrical work which may be proposed, the Electrical Contractor shall furnish to the General Contractor/Construction Manager, an itemized breakdown of the estimated cost of all materials and labor required to complete this work. The estimate cost breakdown shall include unit prices (same prices for increase/decrease of work) for all materials (i.e. wire, conduit, devices, equipment, equipment rental, etc.) and all labor (i.e. manhours, overtime, etc.) which may be required for any proposed extra work. The Contractor shall not proceed until receiving a written order from the General Contractor establishing the agreed price and describing the work to be done.

**3.16 DRAWINGS AND MEASUREMENTS**

- A. These specifications and accompanying drawings are intended to describe and provide for finished work. They are intended to be cooperative, and what is called for by either the drawings or specifications shall be as binding as if call for by both. The work herein described shall be complete in every detail.
- B. The Drawings are not intended to be scaled for rough-in measurements, nor to serve as Shop Drawings. Field measurements necessary for ordering materials and fitting the installation to the building construction and arrangement shall be taken by the Contractor. The Contractor shall check latest architectural drawings to locate light switches, check latest structural drawings for interferences, etc.

**3.17 DEMOLITION AND REMOVAL WORK**

- A. All demolition of existing electrical equipment and materials shall be done by the Contractor unless otherwise indicated.
- B. In general, demolition work is indicated on the drawings. However, the Contractor shall visit the job to determine the full extent and character of this work.
- C. The Contractor shall review all other contract documents (i.e. architectural plans, mechanical plans, etc.) to review the extent of demolition and remodeling work.
- D. Unless specifically noted, removed materials shall not be reused in the work. Salvaged materials that are to be reused shall be stored safe against damage and turned over to the appropriate trade for reuse. Salvaged materials of value that are not to be reused shall remain the property of the Owner unless such ownership is waived. Remove items from the systems and turn over to the Owner unless such ownership is waived. Items on which the Owner waives ownership shall become the property of the Contractor, who shall remove and legally dispose of same, away from the premises. Properly dispose of lighting fixture lamps and ballasts.
- E. Work that has been cut or partially removed shall be protected against damage until covered by permanent construction.
- F. Where equipment or fixtures are removed, wire shall be removed, outlets shall be properly blanked off, and conduits capped. After alterations are done, the entire installation shall present a "finished" look, as approved by the Architect and/or Engineer. The original function of the existing electrical work to be modified shall not be changed unless required by the specific revisions shown on the drawings.

- G. The Contractor is required to maintain service by rerouting wiring for power and lights as necessary. Where walls and ceilings are to be removed as shown on the drawings, the conduit is to be cut off by the Electrical Trades so that the abandoned conduit in these walls and ceilings may be removed with the walls and ceilings by the Architectural Trades. All dead-end conduit runs shall be plugged at the remaining line outlet boxes or the panels.
- H. Where new walls, ceilings, and/or floors are installed which interfere with existing outlets, devices, etc., which are to remain, the Electrical Trades shall adjust, extend and reconnect such items as required to maintain continuity of same.
- I. Where devices on existing walls are no longer active, but wires feeding outlets are active, provide blank cover plates and box extensions are required to meet new finishes. Where devices and wires feeding them are no longer active, fill outlet boxes with plaster for finishing by others.
- J. Where circuits, conduit, boxes, etc. are no longer used/in service they shall be entirely removed back to the panel (source of power).
- K. Where shown as to use existing circuits and equipment in remodeled areas, the Contractor shall verify circuit identification, circuit loads, and as-build methods of installation to complete the demolition and new work in accordance with current codes.
- L. Conceal all electrical work wherever possible. Use of surface raceway ("Wiremold") or exposed conduits will be permitted only where approved by the Architect and/or Engineer.
- M. Existing lighting shall be reused where indicated on plans. Reused fixtures shall be cleaned with detergent, re-lamped and reconditioned for satisfactory operation and appearance.

### **3.18 WORK IN EXISTING BUILDINGS**

- A. The Owner will provide access to existing buildings as required. Access requirements to occupied buildings shall be identified on the project schedule. The Contractor, once work is started in the existing building, shall complete same work without interruption so as to return work areas as soon as possible to Owner.
- B. Adequately protect and preserve all existing and newly installed work. The Contractor shall repair any damages that they are responsible for at their expense.
- C. Consult with the Architect and/or Engineer as to the methods of carrying on the work so as not to interfere with the Owner's operation any more than absolutely necessary. Accordingly, all service lines shall be kept in operation as long as possible and the services shall only be interrupted at such time as will be designated by the Architect, Engineer, and/or Owner's Representative.

## **END OF SECTION**

## **SECTION 26 0519**

### **LOW-VOLTAGE ELECTRICAL POWER CABLES (600 V AND LESS)**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Wire and cable for 600 volts and less.
- B. Wiring connectors and connections.

##### **1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 SUBMITTALS**

- A. Test Reports: Indicate procedures and values obtained.
- B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency.
- C. Project Record Documents: Record actual locations of components and circuits.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Furnish products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

##### **1.05 PROJECT CONDITIONS**

- A. Verify that field measurements are as shown on the Drawings.
- B. Conductor sizes are based upon copper unless indicated as aluminum "AL" on the Drawings.
- C. Wire and cable routing shown on the Drawings are approximate unless dimensioned. Route wire and cable as required to meet project conditions.
- D. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

#### **PART 2 PRODUCTS**

##### **2.01 WIRING REQUIREMENTS**

- A. Concealed Dry Interior Locations: Use only building wire in raceway or metal clad cable.
- B. Exposed Dry Interior Locations: Use only building wire in raceway or building wire with Type THHN, THWN, XHHW insulation in raceway.
- C. Above Accessible Ceilings: Use only building wire in raceway or metal clad cable.
- D. Wet or Damp Interior Locations: Use only building wire with Type THWN, XHHW insulation in raceway.
- E. Exterior Locations: Use only building wire with Type THWN or XHHW insulation in raceway.
- F. Underground Installations: Use only building wire with Type THWN or XHHW insulation in raceway.
- G. Use stranded conductors for control circuits.

- H. Use conductor not smaller than 10 AWG for power and lighting circuits.
- I. Use conductor not smaller than 14 AWG for control circuits.
- J. Use 10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet (25 m).
- K. Use 8 AWG conductors for 30 ampere, 120 volt branch circuits longer than 75 feet.
- L. Use 10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet (60 m).
- M. Use 8 AWG conductors for 30 ampere, 277 volt branch circuits longer than 200 feet.
- N. Conductor sizes are based on copper unless indicated as aluminum or "AL".
- O. All feeders not sized on the plans shall be sized by the CONTRACTOR for a maximum of 2% voltage drop. All branch circuits shall be sized for a maximum of 3% voltage drop.

## **2.02 WIRE MANUFACTURERS**

- A. Cerro Wire Inc.: [www.cerrowire.com](http://www.cerrowire.com).
- B. Industrial Wire & Cable, Inc.: [www.iewc.com](http://www.iewc.com).
- C. Southwire Company: [www.southwire.com](http://www.southwire.com).
- D. Royal.
- E. Rome.
- F. General Cable.
- G. Triangle.

## **2.03 BUILDING WIRE**

- A. Description: Single conductor insulated wire.
- B. Conductor: Copper. Class B strand per ICEA S-61-402.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation: NFPA 70.
  - 1. For Feeders and Branch Circuits Equal to and Smaller Than 4/0 AWG (Dry and Damp locations): Type THHN rated 90 degrees C.
  - 2. For Feeders and Branch Circuits Equal to and Smaller Than 4/0 AWG (Wet locations): Type THWN rated 90 degrees C.
  - 3. For Feeders and Branch Circuits Larger Than 4/0 AWG (Dry and Damp locations): Type XHHW rated 90 degrees C.
- E. Color Coding:
  - 1. Branch circuits shall have their insulation color coded the entire length as noted below.
  - 2. Feeder conductors shall have their ends taped, when entering junction boxes or panels, as noted below.
  - 3. Color coding shall be as follows:
    - a. 208/120 volt, 3 phase, 4 wire:
      - 1) grounded neutral - white
      - 2) phase A hot leg - black
      - 3) phase B hot leg - red
      - 4) phase C hot leg - blue
      - 5) ground - green

- b. 480/277 volt, 3 phase, 4 wire:
  - 1) grounded neutral - white with a color tracer
  - 2) phase A hot leg - brown
  - 3) phase B hot leg - orange
  - 4) phase C hot leg - yellow
  - 5) ground - green with a color tracer
- c. 480 volt, 3 phase, 3 wire:
  - 1) phase A hot leg - brown
  - 2) phase B hot leg - orange
  - 3) phase C hot leg - yellow
  - 4) ground - green with a color tracer

## **2.04 CONTROL WIRING**

- A. Control circuit, single conductor field wire shall be No. 14 AWG, stranded copper with 30 mil thick wall of cross linked polyethylene or polyvinyl chloride insulation rated to withstand a copper temperature of 90 degrees C. at 600 volts without deterioration. It shall meet applicable ICEA Standards.
- B. Multi conductor control cable shall consist of individual conductors, No. 14 AWG, stranded copper with 30 mil thick wall of insulation rated to withstand a copper temperature of 75 degrees C without deterioration. The insulation shall be a 20 mil wall of polyethylene with a 10 mil thick polyvinyl chloride jacket. The individual conductors shall be identified per Paragraph 5.6.3. of ICEA Publication No. S 61402 and shall be cabled together with suitable fillers and binder tape to give the completed cable a substantially circular cross section.

## **2.05 METAL CLAD CABLE (TYPE MC CABLE)**

- A. Description: NFPA 70, Type MC.
- B. Conductor: Copper.
- C. Insulation Voltage Rating: 600 volts.
- D. Insulation Temperature Rating: 75 degrees C.
- E. Insulation Material: Thermoplastic.
- F. Armor Material: Steel.
- G. Armor Design: Interlocked metal tape.
- H. Fittings: Shall be specifically designed for use with type MC cable.
- I. Where required by Code, in Institutional Group Occupancies (Hospitals, Nursing Homes, etc.) all MC cables shall be "hospital grade" MC cable.

## **2.06 WIRING CONNECTORS**

- A. Split Bolt Connectors:
  - 1. Manufacturers:
    - a. Black Burn.
    - b. T & B.
    - c. Burndy.
- B. Solderless Pressure Connectors:

1. Manufacturers:
  - a. AMP.
  - b. T & B.
  - c. 3 M.
- C. Spring Wire Connectors:
  1. Manufacturers:
    - a. Buchanah Model B-Cap.
    - b. 3 M Model Scotchlok or Hyflex.
    - c. Panduit Model P-Conn.
- D. Compression Connectors:
  1. Manufacturers:
    - a. Neer.
    - b. T & B.
    - c. Appleton.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that mechanical work likely to damage wire and cable has been completed.
- C. Verify that raceway installation is complete and supported.
- D. Verify that field measurements are as indicated.

### **3.02 PREPARATION**

- A. Completely and thoroughly swab raceway before installing wire.

### **3.03 INSTALLATION**

- A. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Route wire and cable as required to meet project conditions.
  1. Wire and cable routing indicated is approximate unless dimensioned.
  2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
- C. Use wiring methods indicated.
- D. All wiring shall be installed in conduit or approved raceway. All raceways shall be provided with a ground conductor unless noted otherwise.
- E. Use stranded conductors for control circuits.
- F. Pull all conductors into raceway at same time.
- G. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- H. Protect exposed cable from damage.
- I. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure. Do not rest cable on ceiling panels.
- J. Use suitable cable fittings and connectors.

- K. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- L. Clean conductor surfaces before installing lugs and connectors.
- M. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- N. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- O. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.
- P. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- Q. Identify and color code wire and cable under provisions of Section 26 0553. Identify each conductor with its circuit number or other designation indicated.
- R. Branch circuits may be combined up to 8 conductors (A-phase, B-phase, C-phase, neutral and A-phase, B-phase, C-phase, neutral) and 2 ground conductors in conduit. Contractor shall be responsible for derating conductors as required by N.E.C Article 310, Note 8.
- S. Do not share neutral conductor on load side of dimmers.
- T. Branch circuit neutral conductors: The use of multi-wire branch circuits with a common neutral is not permitted. Each branch circuit shall be furnished and installed with an accompanying neutral conductor sized the same as the phase conductor.
- U. Where required by Code, in Institutional Group Occupancies (Hospitals, Nursing Homes, etc.) all cables shall be wire in conduit or "hospital grade" MC cable.

## **END OF SECTION**



## **SECTION 26 0526**

### **GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Grounding and bonding components.
- B. Provide all components necessary to complete the grounding system(s) consisting of:
  - 1. Existing metal underground water pipe.
  - 2. Metal frame of the building.
  - 3. Concrete-encased electrode.
  - 4. Rod electrodes.

##### **1.02 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code; National Fire Protection Association.
- B. NFPA 99 - Standard for Health Care Facilities; National Fire Protection Association.

##### **1.03 PERFORMANCE REQUIREMENTS**

- A. Grounding System Resistance: 5 ohms.

##### **1.04 SUBMITTALS**

- A. Test Reports: Indicate overall resistance to ground and resistance of each electrode.
- B. Project Record Documents: Record actual locations of components and grounding electrodes.
- C. Certificate of Compliance: Indicate approval of installation by authority having jurisdiction.

##### **1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience with service facilities within 100 miles of Project.
- C. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- D. The Contractor shall be responsible for providing all grounding required in accordance with NEC and local code requirements. Grounding shown on the plans is minimum required.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Cooper Power Systems: [www.cooperpower.com](http://www.cooperpower.com).
- B. Framatome Connectors International: [www.fciconnect.com](http://www.fciconnect.com).
- C. Lightning Master Corporation: [www.lightningmaster.com](http://www.lightningmaster.com).
- D. American Electric.
- E. Chance.
- F. Burndy.
- G. Cadweld.

**2.02 GENERAL**

- A. The contractor shall install a grounding system in accordance with the drawings, specifications, and with the National Electrical Code, NEMA, USASI, and IEEE Standards, latest editions. The ground bar at the main service disconnect shall be bonded to the water mains, structural steel, and driven ground rods, by grounding electric code conductors. Maximum grounding resistance shall be achieved per NEC requirements.

**2.03 ELECTRODES**

- A. Manufacturers:
  - 1. Cooper Power Systems: [www.cooperpower.com](http://www.cooperpower.com).
  - 2. Framatome Connectors International: [www.fciconnect.com](http://www.fciconnect.com).
  - 3. Lightning Master Corporation: [www.lightningmaster.com](http://www.lightningmaster.com).
  - 4. Chance.
  - 5. American Electric - Blackburn.
- B. Rod Electrodes: Copper-clad steel.
  - 1. Diameter: 3/4 inch (19 mm).
  - 2. Length: 10 feet (3000 mm).

**2.04 CONNECTORS AND ACCESSORIES**

- A. Mechanical Connectors: Bronze.
  - 1. Manufacturers: Chance, Burndy, American Electric - Blackburn.
- B. Exothermic Connections:
  - 1. Product: Cadweld.
- C. Wire: Stranded copper.
- D. Foundation Electrodes: #2/0 AWG minimum.
- E. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify existing conditions prior to beginning work.
- B. Verify that final backfill and compaction has been completed before driving rod electrodes.

**3.02 INSTALLATION**

- A. Install rod electrodes as required to achieve specified resistance to ground.
- B. Provide grounding electrode conductor and connect to reinforcing steel in foundation footing. Bond steel together.
- C. Provide bonding to meet requirements described in Quality Assurance.
- D. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.
- E. Ground cables shall be protected by sleeves where the cables extend through a concrete surface. Ground inserts shall be used where ground cables extending through the surface would be exposed to damage during or after construction.
- F. Where ground cables are installed in metallic conduit, the cables shall be bonded to the conduit at both ends of the run.

- G. Welds on ground cables shall be cleaned and painted with an asphalt base paint where buried underground or imbedded in concrete.
- H. Install a minimum #12 AWG green grounding wire for each branch circuit. The grounding wire shall be connected to the grounding terminal bus bars in panelboards, and these bars shall be grounded to the building's grounding system.
- I. Circuits run in PVC conduit shall have a separate ground wire.

## **END OF SECTION**

## **SECTION 26 0529**

### **HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Conduit and equipment supports.
- B. Anchors and fasteners.

##### **1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized. All structural supports and channels shall be manufactured from a minimum of #16 gauge ASTM A570 grade 33 steel.
- C. Anchors and Fasteners:
  - 1. Do not use spring clips.
  - 2. Obtain permission from ENGINEER before using powder-actuated anchors.
  - 3. Concrete Structural Elements: Use precast inserts, expansion anchors, or preset inserts.
  - 4. Steel Structural Elements: Use beam clamps or welded fasteners.
  - 5. Concrete Surfaces: Use expansion anchors.
  - 6. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use hollow wall fasteners.
  - 7. Solid Masonry Walls: Use expansion anchors or preset inserts.
  - 8. Sheet Metal: Use sheet metal screws.
  - 9. Wood Elements: Use wood screws.
- D. Formed Steel Channel:
  - 1. Product: B-Line Strut.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install hangers and supports as required to adequately and securely support electrical system components, in a neat and workmanlike manner, as specified in NECA 1.
  - 1. Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.
  - 2. Obtain permission from Engineer before drilling or cutting structural members.
- B. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.
- C. Install surface-mounted cabinets and panelboards with minimum of four anchors.
- D. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.
- E. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

## **END OF SECTION**

## **SECTION 26 0534**

### **CONDUIT**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Conduit, fittings and conduit bodies.

##### **1.02 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC).
- B. ANSI C80.3 - American National Standard for Steel Electrical Metallic Tubing (EMT).
- C. ANSI C80.5 - American National Standard for Electrical Rigid Aluminum Conduit (ERAC).
- D. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- E. NECA 101 - Standard for Installing Steel Conduit (Rigid, IMC, EMT); National Electrical Contractors Association.
- F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association.
- G. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; National Electrical Manufacturers Association.
- H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Tubing and Conduit; National Electrical Manufacturers Association.
- I. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing; National Electrical Manufacturers Association.
- J. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 SUBMITTALS**

- A. Project Record Documents: Accurately record actual routing of conduits larger than 2 inches (51 mm) in diameter.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.
- C. Explosion-Proof Rated Areas: All conduits installed in explosion proof areas shall be PVC coated galvanized rigid steel conduit with explosion-proof fittings rated for the Hazardous Class Division as required by NEC and applicable NFPA rules. Sealing fittings shall be properly installed at all required locations in accordance with code regulations. Automatic drain conduit seals shall be used wherever necessary to ensure the prevention of moisture accumulation. Approved breathers shall be installed in appropriate locations.

##### **1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Accept conduit on site. Inspect for damage.
- B. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- C. Protect PVC conduit from sunlight.

**1.06 PROJECT CONDITIONS**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify routing and termination locations of conduit prior to rough-in.
- C. Conduit routing shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system.
- D. Coordinate painting requirements of exposed conduit in finished areas with specification section 09900 and color with Architect.

**PART 2 PRODUCTS****2.01 CONDUIT REQUIREMENTS**

- A. Conduit Size: Comply with NFPA 70.
  - 1. Minimum Size: 3/4 inch (19 mm) where concealed within inaccessible construction (i.e. within walls, above drywall ceilings, etc.), 1/2" minimum elsewhere.
- B. Underground Installations:
  - 1. More than 5 Feet (1.5 Meters) from Foundation Wall: Use galvanized rigid steel conduit, thickwall nonmetallic conduit, or thinwall nonmetallic conduit.
  - 2. Within 5 Feet (1.5 Meters) from Foundation Wall: Use galvanized rigid steel conduit, or thickwall nonmetallic conduit.
  - 3. In or Under Slab on Grade: Use galvanized rigid steel conduit, or thickwall nonmetallic conduit.
  - 4. Minimum Size: 1 inch (25 mm).
- C. Outdoor Locations Above Grade: Use galvanized rigid steel conduit.
- D. In Slab Above Grade:
  - 1. Use galvanized rigid steel conduit.
  - 2. Maximum Size Conduit in Slab: 3/4 inch (19 mm); 1/2 inch (13 mm) for conduits crossing each other.
- E. Wet and Damp Locations: Use galvanized rigid steel conduit or rigid aluminum conduit
- F. Dry Locations:
  - 1. Concealed: Use galvanized rigid steel conduit or electrical metallic tubing.
  - 2. Exposed: Use galvanized rigid steel conduit or electrical metallic tubing.
- G. Transformer and Motor Connections:
  - 1. Liquidtight flexible metal conduit (maximum length shall be 3'-0").
- H. Lighting fixtures:
  - 1. Interior: From junction box to lighting fixture shall be flexible metal conduit (maximum length shall be 6'-0").
  - 2. Exterior: From junction box to lighting fixture shall be liquidtight flexible metal conduit (maximum length shall be 3'-0").
- I. AC/MC Cable:
  - 1. Use for concealed branch circuit drops to devices or light fixtures. Do not use AC/MC cable for homeruns to panelboards.



- J. Control Wiring (fire alarm, clock systems, bell systems, paging systems, sound systems, security systems, temperature controls systems):
  - 1. Use electrical metallic tubing, except when making final connection to moving equipment where flexible conduit or sealtite should be used.

## **2.02 METAL CONDUIT**

- A. Manufacturers:
  - 1. Allied Tube & Conduit: [www.alliedtube.com](http://www.alliedtube.com).
  - 2. Beck Manufacturing, Inc.: [www.beckmfg.com](http://www.beckmfg.com).
  - 3. Wheatland Tube Company: [www.wheatland.com](http://www.wheatland.com).
  - 4. Century.
- B. Rigid Steel Conduit: ANSI C80.1. Galvanized Rigid Steel (GRS).
- C. Rigid Aluminum Conduit: ANSI C80.5.
- D. Fittings and Conduit Bodies: NEMA FB 1; material to match conduit.
  - 1. Connectors and couplings shall be threaded, set-screw, or compression type, and concrete tight and/or rain tight where required.
  - 2. Locknuts shall be malleable iron or steel. Bushings shall be malleable iron, steel, or plastic. Malleable iron or steel bushings shall be zinc or cadmium plated and shall have insulating insert of thermostatic plastic molded and locked into bushing ring. Plastic bushings shall be thermostatic phenolic insulating type. Use of non-rigid plastic bushings is prohibited.

## **2.03 FLEXIBLE METAL CONDUIT**

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc.: [www.afcweb.com](http://www.afcweb.com).
  - 2. Electri-Flex Company: [www.electriflex.com](http://www.electriflex.com).
  - 3. International Metal Hose: [www.metalhose.com](http://www.metalhose.com).
- B. Description: Interlocked steel construction.
- C. Fittings: NEMA FB 1. cast fittings.
- D. Flexible metal conduit shall have a separate grounding conductor.

## **2.04 LIQUIDTIGHT FLEXIBLE METAL CONDUIT**

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc.: [www.afcweb.com](http://www.afcweb.com).
  - 2. Electri-Flex Company: [www.electriflex.com](http://www.electriflex.com).
  - 3. International Metal Hose: [www.metalhose.com](http://www.metalhose.com).
  - 4. Anaconda Type "UA" for less than 1-1/4" and Type "EF" for larger than 1-1/2".
- B. Description: Interlocked steel construction with PVC jacket.
- C. Fittings: NEMA FB 1. cast fittings.
- D. Flexible metal conduit shall have a separate grounding conductor.

## **2.05 ELECTRICAL METALLIC TUBING (EMT)**

- A. Manufacturers:
  - 1. Allied Tube & Conduit: [www.alliedtube.com](http://www.alliedtube.com).

2. Beck Manufacturing, Inc.: [www.beckmfg.com](http://www.beckmfg.com).
  3. Wheatland Tube Company: [www.wheatland.com](http://www.wheatland.com).
- B. Description: ANSI C80.3; galvanized tubing.
- C. Fittings and Conduit Bodies: NEMA FB 1; steel or malleable iron set screw type.
1. Connectors and couplings shall be threaded, set-screw, or compression type, and concrete tight and/or rain tight where required.
  2. Locknuts shall be malleable iron or steel. Bushings shall be malleable iron, steel, or plastic. Malleable iron or steel bushings shall be zinc or cadmium plated and shall have insulating insert of thermostatic plastic molded and locked into bushing ring. Plastic bushings shall be thermostatic phenolic insulating type. Use of non-rigid plastic bushings is prohibited.

## **2.06 NONMETALLIC CONDUIT**

- A. Manufacturers:
1. AFC Cable Systems, Inc.: [www.afcweb.com](http://www.afcweb.com).
  2. Electri-Flex Company: [www.electriflex.com](http://www.electriflex.com).
  3. Carlon.
- B. Description: NEMA TC 2; Schedule 40 = Thinwall; 80 = Thickwall PVC.
- C. Fittings and Conduit Bodies: NEMA TC 3.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify routing and termination locations of conduit prior to rough-in.
- B. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

### **3.02 INSTALLATION**

- A. Install conduit securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install steel conduit as specified in NECA 101.
- C. Install nonmetallic conduit in accordance with manufacturer's instructions.
- D. Arrange supports to prevent misalignment during wiring installation.
- E. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.
- F. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.
- G. Fasten conduit supports to building structure and surfaces under provisions of Section 26 0529.
- H. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.
- I. Do not attach conduit to ceiling support wires.
- J. Arrange conduit to maintain headroom and present neat appearance.
- K. Route exposed conduit parallel and perpendicular to walls.
- L. Route conduit installed above accessible ceilings parallel and perpendicular to walls.
- M. Route conduit in and under slab from point-to-point.

- N. Do not cross conduits in slab.
- O. Maintain adequate clearance between conduit and piping.
- P. Maintain 12 inch (300 mm) clearance between conduit and surfaces with temperatures exceeding 104 degrees F (40 degrees C).
- Q. Cut conduit square using saw or pipecutter; de-burr cut ends.
- R. Bring conduit to shoulder of fittings; fasten securely.
- S. Join nonmetallic conduit using cement as recommended by manufacturer. Wipe nonmetallic conduit dry and clean before joining. Apply full even coat of cement to entire area inserted in fitting. Allow joint to cure for 20 minutes, minimum.
- T. Use conduit hubs or sealing locknuts to fasten conduit to sheet metal boxes in damp and wet locations, and to cast boxes.
- U. Install no more than equivalent of three 90 degree bends between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2 inch (50 mm) size. Elbows larger than 3" dia. shall be long radius elbows.
- V. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.
- W. Provide suitable fittings to accommodate expansion and deflection where conduit crosses seismic, control, and expansion joints.
- X. Provide suitable pull string in each empty conduit except sleeves and nipples.
- Y. Use suitable caps to protect installed conduit against entrance of dirt and moisture.
- Z. Ground and bond conduit under provisions of Section 26 0526.
- AA. Identify conduit under provisions of Section 26 0553.
- BB. Underground exterior conduits shall be sloped away from the building at a minimum of 4" per 100' or 0.33%.
- CC. Install insulating bushings at open ends of telephone, data, video, security, etc. conduits.
- DD. Drawstrings shall be provided for all new empty conduits. Drawstring shall be wax impregnated, nylon, or other synthetic material resistant to moisture and mildew to prevent deterioration.
- EE. All underground conduits and/or duct banks shall be installed 24" minimum below grade (unless noted otherwise) and shall slope minimum of 0.33% to manholes, handholes, cable vaults, or other structures.

### 3.03 FIRESTOPPING

- A. Use only firestop products that have been tested according to ASTM E-814 and UL 1479 for the conditions set forth regarding construction assembly type, penetrating item type, annular space requirements and fire rating.
- B. Install conduit to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 8400.
  - 1. For non-combustible penetrations including conduit not passing through a sleeve, the following materials are acceptable:
    - a. Hilti FS 601 Elastmeric Firestop Sealant.
    - b. 3 M.
    - c. CSD Sealing Systems.
    - d. Firestop Systems.
  - 2. For non-combustible penetrations including sleeved conduits, the following materials are

acceptable:

- a. Hilti FS 601 Elastmeric Firestop Sealant.
  - b. 3 M.
  - c. CSD Sealing Systems.
  - d. Firestop Systems.
3. For combustible penetrations including cables and cable bundles, the following materials are acceptable:
- a. Hilti FS 611A Intumescent Firestop Sealant.
  - b. 3 M.
  - c. CSD Sealing Systems.
  - d. Firestop Systems.
4. For large or complex penetrations involving multiple conduits, cable trays, electrical busway, etc. the following materials are acceptable:
- a. Hilti FS 635 Firestop Compound.
  - b. 3 M.
  - c. CSD Sealing Systems.
  - d. International Protective Coatings - KBS Sealbags.

#### **3.04 PAINTING**

- A. All conduit exposed in finished areas shall be painted to match the surrounding finishes. Refer to specification section 09900 - Coordinate color with Architect.

**END OF SECTION**

## **SECTION 26 0537**

### **BOXES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Wall and ceiling outlet boxes.
- B. Pull and junction boxes.

##### **1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- B. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association.
- C. NEMA OS 1 - Sheet Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 SUBMITTALS**

- A. Product Data: Provide dimensions, knockout sizes and locations, materials, fabrication details, finishes, and accessories.
- B. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency specified under Quality Assurance. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- C. Project Record Documents: Record actual locations and mounting heights of outlet, pull, and junction boxes on project record documents.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Provide products listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.
- C. Pull boxes, junction boxes, and cable support boxes of proper size and design shall be provided in accordance with the N.E.C. and as required to facilitate installation of wires. All boxes shall be sized in accordance with the N.E.C. Covers shall be gasketed and held in place with corrosion resistant machine screws. Cable supports for vertical runs shall be provided at code required locations, within pull or junction boxes. Boxes shall be NEMA 12 for inside and NEMA 4 for outside use where exposed to the weather or where otherwise called for on the drawings.

#### **PART 2 PRODUCTS**

##### **2.01 OUTLET BOXES**

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
  - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch (13 mm) male fixture studs where required.
  - 2. Concrete Ceiling Boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, cast ferrous alloy. Provide gasketed cover by box

manufacturer. Provide threaded hubs.

- C. Wall Plates for Finished Areas: As specified in Section 26 2726.
- D. Outlet and switch boxes shall be minimum of 2-1/8" deep. When installed in a poured wall a 2-1/2" minimum deep box shall be used. When installed in masonry a 3-1/2" minimum deep box shall be used.
- E. Use 2-gang 4" square boxes with single plaster rings for single device outlets.

## **2.02 PULL AND JUNCTION BOXES**

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 26 2716.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4; flat-flanged, surface mounted junction box:
  - 1. Material: Galvanized cast iron.
  - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
- D. In-Ground Cast Metal Box: NEMA 250, Type 6, inside flanged, recessed cover box for flush mounting:
  - 1. Material: Galvanized cast iron.
  - 2. Cover: Smooth cover with neoprene gasket and stainless steel cover screws.
  - 3. Cover Legend: "ELECTRIC".
- E. Fiberglass Handholes: Die molded glass fiber hand holes:
  - 1. Composite handholds shall be constructed of polymer concrete and reinforced by a heavy weave fiberglass. The handholes shall have internal dimensions indicated on plans, minimum size 36"L x 24"W x 30"Deep. The material shall have the following properties:
    - a. Compressive strength: 11,000 PSI; Tensile strength: 1,700 PSI; Flexural strength: 7,500 PSI.
  - 2. Cable Entrances: Pre-cut 4 x 4 inch cable entrance mouseholes at center bottom of each side.
  - 3. Cover: Glass fiber weatherproof cover with nonskid finish, stainless steel screws, and labeled "ELECTRIC".
  - 4. Provide all accessories (i.e top/bottom extensions, etc.) as required to accommodate conduit routings into/out of the handholes.
  - 5. Manufacturer:
    - a. Hubbell, Quazite.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Electrical boxes are shown on Drawings in approximate locations unless dimensioned. Install at location required for box to serve intended purpose.

### **3.02 INSTALLATION**

- A. Install boxes securely, in a neat and workmanlike manner, as specified in NECA 1.
- B. Install in locations as shown on Drawings, and as required for splices, taps, wire pulling, equipment connections, and as required by NFPA 70.
- C. Coordinate installation of outlet boxes for equipment connected under Section 26 2717.

- D. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
- E. Electrical boxes are shown on Drawings in approximate locations unless dimensioned.
- F. Orient boxes to accommodate wiring devices oriented as specified in Section 26 2726.
- G. Install pull boxes and junction boxes above accessible ceilings and in unfinished areas only.
- H. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches (150 mm) from ceiling access panel or from removable recessed luminaire.
- I. Provide identification labels on all junction boxes indicating what systems/equipment circuits are feeding (i.e. Lights in Room #102) and where they are being fed from (i.e. Panel LP-1)
- J. Install boxes to preserve fire resistance rating of partitions and other elements.
- K. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
- L. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
- M. Align adjacent wall mounted outlet boxes for switches, thermostats, and similar devices.
- N. Use flush mounting outlet box in finished areas.
- O. Locate flush mounting box in masonry wall to require cutting of masonry unit corner only. Coordinate masonry cutting to achieve neat opening.
- P. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches (150 mm) separation. Provide minimum 24 inches (600 mm) separation in acoustic rated walls.
- Q. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
- R. Use stamped steel bridges to fasten flush mounting outlet box between studs.
- S. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
- T. Use adjustable steel channel fasteners for hung ceiling outlet box.
- U. Do not fasten boxes to ceiling support wires.
- V. Support boxes independently of conduit, except cast box that is connected to two rigid metal conduits both supported within 12 inches (305 mm) of box.
- W. Use gang box where more than one device is mounted together. Do not use sectional box. Telephone/Data gang boxes shall be separate from power device gang boxes.
- X. Use 2-gang 4" square boxes with single plaster rings for single device outlets.
- Y. Use cast outlet box in exterior locations and wet locations.
- Z. Large Pull Boxes (boxes larger than 100 cubic inches in volume or 12 inches in any dimension): Use hinged enclosure in interior dry locations, surface-mounted cast metal box in other locations.

### **3.03 ADJUSTING**

- A. Adjust floor boxes flush with finish flooring material.
- B. Adjust flush-mounting outlets to make front flush with finished wall material.
- C. Install knockout closures in unused box openings.

## **END OF SECTION**



## **SECTION 26 0553**

### **IDENTIFICATION FOR ELECTRICAL SYSTEMS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Nameplates and labels.
- B. Wire and cable markers.
- C. Conduit markers.
- D. Underground wiring tape.
- E. Panel schedules.

##### **1.02 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for purpose specified and shown.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Brady Corporation: [www.bradycorp.com](http://www.bradycorp.com).
- B. Seton Identification Products: [www.seton.com/aec](http://www.seton.com/aec).
- C. Thomas & Betts.
- D. Panduit.

##### **2.02 NAMEPLATES AND LABELS**

- A. Nameplates: Engraved three-layer laminated plastic, black letters on white background.
- B. Locations:
  - 1. Each electrical distribution and control equipment enclosure (including starters, disconnects, panelboards, breakers at distribution panels, etc.).
  - 2. Communication cabinets.
- C. Letter Size:
  - 1. Use 1/2 inch letters for identifying equipment and loads. Identification shall indicate where the load is fed from.

##### **2.03 WIRE MARKERS**

- A. Description: Vinyl cloth type self-adhesive wire markers.
- B. Description: tape or split sleeve type wire markers.
- C. Locations: Each conductor at panelboard gutters, pull boxes, and junction boxes each load connection.
  - 1. Identify circuit feeder numbers at all wiring devices (receptacle, light switches, dimmers, etc.) with a self-adhesive wire marker taped to the back of the device cover plate.

D. Legend:

1. Power and Lighting Circuits: Branch circuit or feeder number indicated on drawings.
2. Control Circuits: Control wire number indicated on shop drawings.

**2.04 CONDUIT MARKERS**

- A. Description: Size: 1-1/8"x4-1/2" minimum. Color: Background color as specified below with black lettering.
- B. Location: Furnish markers for each conduit longer than 6 feet (2 m).
- C. Spacing: 20 feet (6 m) on center.
- D. Color:

1. Fire Alarm System: Red.

E. Legend:

1. 480 Volt System: 480 Volt.
2. 277 Volt System: 277 Volt.
3. 240 Volt System: 240 Volt.
4. Fire Alarm System: Fire Alarm.

**2.05 UNDERGROUND WARNING TAPE**

- A. Description: 4 inch (100 mm) wide plastic tape, detectable type colored red with suitable warning legend describing buried electrical lines.

**2.06 PANEL SCHEDULES**

- A. Each panel shall have a typewritten panel schedule indicating loads. A clear plastic cover over the schedule shall be provided to protect it.
- B. Existing panel schedules shall be improved to indicate all existing loads and/or updated to indicate all changes that have occurred during renovation. Typing over writing over existing entries on existing schedules is not acceptable. A new schedule shall be provided. Entries must be in type written form.

**PART 3 EXECUTION**

**3.01 PREPARATION**

- A. Degrease and clean surfaces to receive nameplates and labels.

**3.02 INSTALLATION**

- A. Install nameplates and labels parallel to equipment lines.
- B. Secure nameplates to equipment front using screws or rivets.
- C. Secure nameplates to inside surface of door on panelboard that is recessed in finished locations.
- D. Identify underground conduits using underground warning tape. Install one tape per trench at 3 inches (75 mm) below finished grade.
- E. Identify all boxes for fire alarm circuits by painting cover plates red.

**END OF SECTION**

## **SECTION 26 0923**

### **LIGHTING CONTROL DEVICES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Occupancy sensors.
- B. Outdoor photo controls.

##### **1.02 REFERENCE STANDARDS**

- A. ANSI C136.10 - American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacles - Physical and Electrical Interchangeability and Testing; 2006.
- B. ANSI C136.24 - American National Standard for Roadway and Area Lighting Equipment - Nonlocking (Button) Type Photocontrols.
- C. NECA 1 - Standard for Good Workmanship in Electrical Contracting.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. NFPA 70 - National Electrical Code; National Fire Protection Association.
- F. UL 773 - Plug-in Locking Type Photocontrols for Use with Area Lighting; Current Edition, Including All Revisions.
- G. UL 773A - Nonindustrial Photoelectric Switches for Lighting Control; Current Edition, Including All Revisions.

##### **1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.
  - 3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.
  - 4. Notify ENGINEER of any conflicts or deviations from the contract documents to obtain direction prior to proceeding with work.
- B. Sequencing:
  - 1. Do not install lighting control devices until final surface finishes and painting are complete.

##### **1.04 SUBMITTALS**

- A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
  - 1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.
- B. Shop Drawings:
  - 1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.
- C. Manufacturer's Installation Instructions: Include application conditions and limitations of use

stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

- D. Operation and Maintenance Data: Include detailed information on device programming and setup.
- E. Maintenance Materials: Furnish the following for OWNER's use in maintenance of project.
  - 1. Extra Locking Receptacle-Mounted Outdoor Photo Controls: Five percent of total quantity installed for each type, but not less than two of each type.
- F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

#### **1.05 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

#### **1.06 DELIVERY, STORAGE, AND PROTECTION**

- A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

#### **1.07 FIELD CONDITIONS**

- A. Maintain field conditions within manufacturer's required service conditions during and after installation.

#### **1.08 WARRANTY**

- A. Provide five year manufacturer warranty for all occupancy sensors.
- B. Provide five year manufacturer warranty for utility grade locking receptacle-mounted outdoor photo controls.

### **PART 2 PRODUCTS**

#### **2.01 ALL LIGHTING CONTROL DEVICES**

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.
- C. Products for Switching of Electronic Fluorescent Ballasts: Tested and rated to be suitable for peak inrush currents specified in NEMA 410.

#### **2.02 OCCUPANCY SENSORS**

- A. Manufacturers:
  - 1. Hubbell Building Automation, Inc.: [www.hubbellautomation.com](http://www.hubbellautomation.com)
  - 2. WattStopper: [www.wattstopper.com](http://www.wattstopper.com).
  - 3. Leviton.
  - 4. Cooper.
  - 5. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.

**B. All Occupancy Sensors:**

1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
2. Sensor Technology:
  - a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.
  - b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.
  - c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.
  - d. Passive Infrared/Acoustic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and audible sound sensing technologies.
3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.
7. Turn-Off Delay: Field adjustable, up to a maximum time delay setting of not less than 15 minutes and not more than 30 minutes.
8. Sensitivity: Field adjustable.
9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.
10. Compatibility: Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.
11. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on the drawings.
12. Isolated Relay for Low Voltage Occupancy Sensors: SPDT dry contacts, ratings as required for interface with system indicated.

**C. Wall Switch Occupancy Sensors:**

1. All Wall Switch Occupancy Sensors:
  - a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
  - b. Unless otherwise indicated or required to control the load indicated on the drawings, provide line voltage units with self-contained relay.
  - c. Where indicated, provide two-circuit units for control of two separate lighting loads, with

separate manual controls and separately programmable operation for each load.

- d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
  - e. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.
  - f. Provide selectable audible alert to notify occupant of impending load turn-off.
  - g. Finish: Match finishes specified for wiring devices in Section 26 2726, unless otherwise indicated.
  - h. Provide vandal resistant lenses for passive infrared (PIR) and dual technology wall switch occupancy sensors where indicated.
2. Passive Infrared/Ultrasonic Dual Technology Wall Switch Occupancy Sensors: Capable of detecting motion within an area of 900 square feet (83.6 sq. m).
- D. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
    - a. Description: Low profile occupancy sensors designed for ceiling installation.
    - b. Unless otherwise indicated or required to control the load indicated on the drawings, provide low voltage units, for use with separate compatible accessory power packs.
    - c. Provide field selectable setting for disabling LED motion detector visual indicator.
    - d. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.
    - e. Finish: White unless otherwise indicated.
  2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:
    - a. Extended Range Sensors: Capable of detecting motion within an area of 1,000-2,000 square feet (111.5 sq. m) at a mounting height of 9 feet (2.7 m), with a field of view of 360 degrees.
- E. Power Packs for Low Voltage Occupancy Sensors:
1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.
  2. Provide HVAC relay contact in all Occupancy Sensors and/or Power Packs for use by HVAC Temperature Controls (T.C.).
  3. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on the drawings.
  4. Input Supply Voltage: Dual rated for 120/277 V ac.
  5. Load Rating: As required to control the load indicated on the drawings.
- F. Accessories:
1. Provide heavy duty coated steel wire protective guards compatible with specified occupancy sensors where indicated.

### 2.03 OUTDOOR PHOTO CONTROLS

- A. Manufacturers:
1. Intermatic, Inc.; [www.intermatic.com](http://www.intermatic.com).
  2. Paragon, a brand of Invensys Controls; [www.invensyscontrols.com](http://www.invensyscontrols.com).

3. Tork, a division of NSI Industries LLC; [www.tork.com](http://www.tork.com).
  4. Source Limitations: Furnish products produced by a single manufacturer and obtained from a single supplier.
- B. Stem-Mounted Outdoor Photo Controls:
1. Description: Direct-wired photo control unit with threaded conduit mounting stem and field-adjustable swivel base, listed and labeled as complying with UL 773A.
  2. Housing: Weatherproof, impact resistant polycarbonate.
  3. Photo Sensor: Cadmium sulfide.
  4. Provide external sliding shield for field adjustment of light level activation.
  5. Light Level Activation: 1 to 5 footcandles (10.8 to 53.8 lux) turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
  6. Voltage: As required to control the load indicated on the drawings.
  7. Failure Mode: Fails to the on position.
  8. Load Rating: As required to control the load indicated on the drawings.
  9. Provide accessory wall-mounting bracket where indicated or as required to complete installation.
- C. Locking Receptacle-Mounted Outdoor Photo Controls
1. Description: Plug-in locking type photo control unit complying with ANSI C136.10 for mounting on a compatible receptacle, listed and labeled as complying with UL 773.
  2. Housing: Weatherproof, impact resistant UV stabilized polypropylene, color to be selected.
  3. Photo Sensor: Cadmium sulfide.
  4. Light Level Activation: 1 to 3 footcandles (10.8 to 32.3 lux) turn-on and 1.5 to 1 turn-off to turn-on ratio with instant turn-on and delayed turn-off.
  5. Voltage: As required to control the load indicated on the drawings.
  6. Failure Mode: Fails to the on position.
  7. Load Rating: As required to control the load indicated on the drawings.
  8. Surge Protection: 160 joule metal oxide varistor.
  9. Provide the following accessories where indicated or as required to complete installation:
    - a. Receptacle: Complying with ANSI C136.10.
    - b. Mounting Bracket.
    - c. Shorting Cap: Suitable for replacing locking photo control to complete circuit.
- D. Button Type Outdoor Photo Controls
1. Description: Direct-wired photo control unit complying with ANSI C136.24 with weatherproof gasketed wall plate where required or indicated, listed and labeled as complying with UL 773A.
  2. Housing: Weather resistant polycarbonate.
  3. Photo Sensor: Cadmium sulfide.
  4. Light Level Activation: 1 to 3 footcandles (10.8 to 32.3 lux) turn-on and 3 to 1 turn-off to turn-on ratio with delayed turn-off.
  5. Voltage: As required to control the load indicated on the drawings.



6. Failure Mode: Fails to the on position.
7. Load Rating: As required to control the load indicated on the drawings.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.
- F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.
- G. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.03 INSTALLATION**

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated
- B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of lighting control devices provided under this section.
  1. Mounting Heights: Unless otherwise indicated, as follows:
    - a. Wall Switch Occupancy Sensors: 48 inches (1.2 m) above finished floor.
  2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.
  3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify ENGINEER to obtain direction prior to proceeding with work.
- C. Install lighting control devices in accordance with manufacturer's instructions.
- D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- E. Install lighting control devices plumb and level, and held securely in place.
- F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 2726.
- G. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- H. Install identification label for wall switch occupancy sensors in accordance with Section 26 0526

indicating load served where indicated, when controlling loads that are not visible from the control location, or when multiple control devices are installed at one location.

I. Occupancy Sensor Locations:

1. Location Adjustments: Locations indicated are diagrammatic and only intended to indicate which rooms or areas require devices. Provide quantity and locations as required for complete coverage of respective room or area based on manufacturer's recommendations for installed devices.
2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet (1.2 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

J. Outdoor Photo Control Locations:

1. Where possible, locate outdoor photo controls with photo sensor facing north. If north facing photo sensor is not possible, install with photo sensor facing east, west, or down.
2. Locate outdoor photo controls so that photo sensors do not face artificial light sources, including light sources controlled by the photo control itself.

K. Install outdoor photo controls so that connections are weatherproof. Do not install photo controls with conduit stem facing up in order to prevent infiltration of water into the photo control.

L. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

M. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.

N. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.

O. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

P. Where indicated or required, provide cabinet or enclosure in accordance with Section 26 2716 for mounting of lighting control device system components.

### 3.04 FIELD QUALITY CONTROL

- A. Inspect each lighting control device for damage and defects.
- B. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.
- C. Test outdoor photo controls to verify proper operation, including time delays where applicable.
- D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

### 3.05 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.
- B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by ENGINEER.
- C. Adjust position of directional occupancy sensors and outdoor motion sensors to achieve optimal coverage as required.
- D. Adjust external sliding shields on outdoor photo controls under optimum lighting conditions to achieve desired turn-on and turn-off activation as indicated or as directed by ENGINEER.

### **3.06 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

### **3.07 CLOSEOUT ACTIVITIES**

- A. Refer to Division 1.
- B. Demonstration: Demonstrate proper operation of lighting control devices to ENGINEER, and correct deficiencies or make adjustments as directed.
- C. Training: Train OWNER's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Provide minimum of two hours of training.
  - 3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.
  - 4. Location: At project site.

**END OF SECTION**

## **SECTION 26 2416**

### **PANELBOARDS**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Overcurrent protective devices for panelboards.

##### **1.02 REFERENCE STANDARDS**

- A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; Federal Specification; Revision D.
- B. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- C. NECA 407 - Standard for Installing and Maintaining Panelboards; National Electrical Contractors Association.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum).
- E. NEMA PB 1 - Panelboards; National Electrical Manufacturers Association.
- F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; National Electrical Manufacturers Association.
- G. NETA STD ATS - Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems; International Electrical Testing Association.
- H. NFPA 70 - National Electrical Code; National Fire Protection Association.
- I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.
- J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.
- K. UL 67 - Panelboards; Current Edition, Including All Revisions.
- L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

##### **1.03 SUBMITTALS**

- A. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
- B. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.
- C. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

##### **1.05 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.
4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.
5. Notify ENGINEER of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.
- B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us). BASE BID Square D, other approved manufacturers may only be bid as a voluntary alternate to the base bid and must be clarified in the bid as such.
- B. Siemens.
- C. GE.

#### **2.01 OVERCURRENT PROTECTIVE DEVICES**

- A. Molded Case Circuit Breakers:
  1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
  2. Interrupting Capacity:
    - a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
    - b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
  3. Conductor Terminations:
    - a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
  4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
  5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- C. Provide grounding and bonding in accordance with Section 26 0526.
- D. Install all field-installed branch devices, components, and accessories.
- E. Install panelboards in accordance with NEMA PB 1.1 and NECA 1.
- F. Provide filler plates to cover unused spaces in panelboards.
- G. Provide computer-generated circuit directory for each lighting and appliance panelboard, and each power distribution panelboard provided with a door, clearly and specifically indicating the loads served. Identify spares and spaces.
- H. Provide typed circuit directory for each branch circuit panelboard. Revise directory to reflect circuiting changes required to balance phase loads.
- I. Provide identification nameplate for each panelboard in accordance with Section 26 0553.
- J. Provide arc flash warning labels in accordance with NFPA 70.

### **3.02 FIELD QUALITY CONTROL**

- A. Perform inspection, testing, and adjusting in accordance with Section 01 4000.
- B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA STD ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 400 amperes. Tests listed as optional are not required.
- C. Correct deficiencies and replace damaged or defective panelboards or associated components.
- D. Visual and Mechanical Inspection: Inspect for physical damage, proper alignment, anchorage, and grounding. Check proper installation and tightness of connections for circuit breakers, fusible switches, and fuses.

### **3.03 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.
- B. Adjust alignment of panelboard fronts.

## **END OF SECTION**

## **SECTION 26 2701**

### **ELECTRICAL SERVICE ENTRANCE**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Metering transformer cabinets and meter bases.
- B. Arrangement with Utility Company for permanent electrical service, including payment of Utility Company charges for service. The Contractor shall be responsible for providing drawings to the Utility Company for Coordination of services and charges.

##### **1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard Practices for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 SYSTEM DESCRIPTION**

- A. Service Entrance: Existing underground service entrance, to be relocated.

##### **1.04 QUALITY ASSURANCE**

- A. Perform work in accordance with utility company written requirements and NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

##### **1.05 PRE-INSTALLATION MEETING**

- A. Convene four (4) weeks prior to commencing work of this section. Review service entrance requirements and details with Utility Company representative.

#### **PART 2 PRODUCTS**

##### **2.01 COMPONENTS**

- A. Metering Transformer Cabinets: Existing sheet metal cabinet with hinged door, conforming to utility company requirements, with provisions for locking and sealing.
- B. Meter Base: Existing, furnished by utility company.
- C. Utility Transformer Pad: Prefabricated precast concrete transformer pad with cable pit.
- D. Other Components: As required by utility company.

#### **PART 3 EXECUTION**

##### **3.01 PREPARATION**

- A. Arrange with utility company to relocate the existing electric service and associated transformer/meter base as required to accommodate the project additions/renovations. The Contractor shall be responsible for providing drawings to the Utility Company for Coordination of services and charges.
- B. Verify that field measurements are as indicated on utility company drawings.

##### **3.02 INSTALLATION**

- A. Install securely, in a neat and workmanlike manner, as specified in NECA 1.

## **END OF SECTION**



## **SECTION 26 2717**

### **EQUIPMENT WIRING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Electrical connections to equipment.

##### **1.02 REFERENCE STANDARDS**

- A. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association.
- B. NEMA WD 6 - Wiring Devices - Dimensional Requirements; National Electrical Manufacturers Association.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

##### **1.04 COORDINATION**

- A. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
- B. Determine connection locations and requirements.
- C. Sequence rough-in of electrical connections to coordinate with installation of equipment.
- D. Sequence electrical connections to coordinate with start-up of equipment.

#### **PART 2 PRODUCTS**

##### **2.01 MATERIALS**

- A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.
  - 1. Colors: Conform to NEMA WD 1.
  - 2. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.
  - 3. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.
- B. Disconnect Switches: As specified in Section 26 2818, 26 2913 and in individual equipment sections.
- C. Wiring Devices: As specified in Section 26 2726.
- D. Flexible Conduit: As specified in Section 26 0534.
- E. Wire and Cable: As specified in Section 26 0519.
- F. Boxes: As specified in Section 26 0537.

#### **PART 3 EXECUTION**

##### **3.01 EXAMINATION**

- A. Verify that equipment is ready for electrical connection, wiring, and energization.

**3.02 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations. Maximum length shall be 6 feet. Minimum size shall be 3/4" diameter.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

**END OF SECTION**

## **SECTION 26 2726**

### **WIRING DEVICES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Wall switches.
- B. Receptacles.
- C. Wall plates.

##### **1.02 REFERENCE STANDARDS**

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G.
- B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); Federal Specification; Revision F.
- C. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- D. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association.
- E. NEMA WD 6 - Wiring Device -- Dimensional Requirements; National Electrical Manufacturers Association.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association.
- G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.
- H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

##### **1.03 SUBMITTALS**

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
- B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Cooper Wiring Devices: [www.cooperwiringdevices.com](http://www.cooperwiringdevices.com).
- B. Leviton Manufacturing, Inc.: [www.leviton.com](http://www.leviton.com).
- C. Hubbell.
- D. Bryant.

**2.02 ALL WIRING DEVICES**

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**2.03 WALL SWITCHES**

- A. All Wall Switches: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.
- B. Wall Switches: NEMA WD 1, General Duty, Spec. Grade, AC only general-use snap switch. Switches shall be binding screw type, side and back wired type.
  - 1. Body and Handle: Ivory plastic with toggle handle. Coordinate color selection with Architect prior to ordering.
  - 2. Ratings: Match branch circuit and load characteristics.
- C. Single Pole Single Throw Wall Switches
  - 1. Products:
    - a. Hubbell 1221.
    - b. Arrow Hart 1991.
    - c. Leviton 1221.
- D. Three Way Wall Switches
  - 1. Products:
    - a. Hubbell 1223.
    - b. Arrow Hart 1993.
    - c. Leviton 1223.
- E. Four Way Wall Switches
  - 1. Products:
    - a. Hubbell 1224.
    - b. Arrow Hart 1994.
    - c. Leviton 1224.

**2.04 RECEPTACLES**

- A. All Receptacles: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- B. Receptacles: NEMA WD 1, General duty, Spec. Grade, grounded type
  - 1. Configuration: NEMA WD 6, type as specified and indicated.
- C. 20 Amp Duplex Convenience Receptacles.
  - 1. Hubbell 5362.
  - 2. Arrow Hart 5362.

3. Leviton 5362.
  4. Device Body: Ivory; Coordinate color selection with Architect prior to ordering. All devices on emergency circuits shall be red in color.
  5. NOTE: All branch circuits feeding outlets installed in dwelling unit bedrooms shall be protected by an arc-fault circuit interruptor, either arc-fault rated outlet or breaker, in accordance with NEC 210.12.
  6. NOTE: All receptacles in residential uses (i.e. apartments, housing, hotels, etc.) shall be "Tamper Resistant" (TR) rated, residential grade. Receptacles within other commercial buildings/areas with children use (i.e. schools, daycare facilities, classrooms, libraries, etc.) shall be "Tamper Resistant" (TR) rated, commercial grade.
- D. 20 Amp GFCI Receptacles: Convenience receptacle with integral ground fault circuit interrupter to meet regulatory requirements.
1. Hubbell.
  2. Arrow Hart.
  3. Leviton.
  4. Device Body: Ivory. Coordinate color selection with Architect prior to ordering. All devices on emergency circuits shall be red in color.
  5. GFCI receptacles shall meet UL 2003 standards.

## **2.05 WALL PLATES**

- A. All Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  2. Screws: Metal with slotted heads finished to match wall plate finish.
- B. Weatherproof Cover Plates (where located outdoors and where indicated on plans as "WP"): Raintight/gasketed, clear impact resistant thermoplastic, spring retained cover with offset device opening for cord exit.
- C. Stainless Steel Cover Plates:
1. Hubbell "S" series.
  2. Leviton 8400 series.
  3. Arrow Hart "S" series.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.
- G. Verify door openings/swings with Architectural trades prior to installation.

- H. Verify existing wall plates and provide new wall plates to match.

### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

### **3.03 INSTALLATION**

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- I. Install wall switches with OFF position down.
- J. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- K. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- L. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- M. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.
- N. Use jumbo size plates for outlets installed in masonry walls.
- O. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

### **3.04 INTERFACE WITH OTHER PRODUCTS**

- A. Coordinate locations of outlet boxes provided under Section 26 0537 to obtain mounting heights indicated on drawings.
- B. Install wall switches, dimmers, motor control switches, and fire alarm pull stations at 50 inches to center of box above finished floor. For CMU walls - 48" to top of box above finished floor.
- C. Install convenience receptacles 18 inches (450 mm) above finished floor to center of box (not otherwise specified).
- D. Install convenience receptacles in CMU walls at 16 inches above floor to bottom of box.
- E. Unless noted otherwise, install GFI receptacles in toilet rooms, janitor closets, and storage

rooms 48 inches to top of the box above floor.

- F. Install convenience receptacles 6 inches (150 mm) above counter. Or as required to accommodate the counter construction - refer to Architectural elevations.
- G. Install telephone jacks, data outlets, communication outlets, etc. 18 inches (450 mm) to center of box above finished floor. For CMU walls - 16" to bottom of box above finished floor.
- H. Install fire alarm horns, strobes, speakers at 96 inches above floor (to top of box) or 6 inches below ceiling, whichever is less. But no lower than 80" above finish floor.
- I. Coordinate all finishes and colors of wiring devices with Architect prior to ordering.
- J. Coordinate mounting height/locations with Architect prior to rough-in.

### **3.05 FIELD QUALITY CONTROL**

- A. Inspect each wiring device for damage and defects.
- B. Test each receptacle to verify operation and proper polarity.
- C. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- D. Correct wiring deficiencies and replace damaged or defective wiring devices.

### **3.06 ADJUSTING**

- A. Adjust devices and wall plates to be flush and level.

### **3.07 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

## **END OF SECTION**



## **SECTION 26 2813**

### **FUSES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Fuses.

##### **1.02 REFERENCE STANDARDS**

- A. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association.
- B. NFPA 70 - National Electrical Code; National Fire Protection Association.
- C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements; Current Edition, Including All Revisions.

##### **1.03 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Products: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

##### **1.04 MAINTENANCE MATERIALS**

- A. Furnish three of each size and type fuse installed.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. Cooper Bussmann, Inc.: [www.cooperbussmann.com](http://www.cooperbussmann.com).
- B. GE Industrial: [www.geindustrial.com](http://www.geindustrial.com).
- C. Mersen (formerly Ferraz Shawmut): [ferrazshawmut.mersen.com](http://ferrazshawmut.mersen.com).
- D. Littelfuse, Inc.: [www.littelfuse.com](http://www.littelfuse.com).

##### **2.02 FUSES**

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.
- B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.
- C. Provide fuses of the same type, rating, and manufacturer within the same switch.
- D. Comply with UL 248-1.
- E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.
- F. Voltage Rating: Suitable for circuit voltage.
- G. Main Service Switches Larger than 600 amperes: Class L (time delay).
- H. Main Service Switches: Class RK1 (time delay).
- I. Power Load Feeder Switches Larger than 600 amperes: Class L (time delay).
- J. Power Load Feeder Switches: Class RK1 (time delay).
- K. Motor Load Feeder Switches: Class RK1 (time delay).

- L. Other Feeder Switches Larger than 600 amperes: L time delay.
- M. Other Feeder Switches: Class RK1 (time delay).
- N. General Purpose Branch Circuits: Class RK1 (time delay).
- O. Motor Branch Circuits: Class L time delay.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Do not install fuses until circuits are ready to be energized.
- B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

## **END OF SECTION**

## **SECTION 26 2818**

### **ENCLOSED SWITCHES**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Fusible switches.
- B. Nonfusible switches.

##### **1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- B. NEMA FU 1 - Low Voltage Cartridge Fuses; National Electrical Manufacturers Association.
- C. NEMA KS 1 - Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum); National Electrical Manufacturers Association.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association.

##### **1.03 SUBMITTALS**

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.
- B. Project Record Documents: Record actual locations of enclosed switches.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.

#### **PART 2 PRODUCTS**

##### **2.01 MANUFACTURERS**

- A. General Electric Company: [www.geindustrial.com](http://www.geindustrial.com).
- B. Schneider Electric; Square D Products: [www.schneider-electric.us](http://www.schneider-electric.us). BASE BID Square D, other approved manufacturers may only be bid as a voluntary alternate to the base bid and must be clarified in the bid as such.
- C. Siemens.

##### **2.02 COMPONENTS**

- A. Fusible Switch Assemblies: 30 thru 600A, NEMA KS 1, Type HD quick-make, quick-break, enclosed load interrupter knife switch.
  - 1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
  - 2. Handle lockable in OFF position.
  - 3. Fuse clips: Designed to accommodate NEMA FU1, Class R fuses.
- B. Nonfusible Switch Assemblies: NEMA KS 1, Type HD quick-make, quick-break, enclosed load interrupter knife switch.
  - 1. Externally operable handle interlocked to prevent opening front cover with switch in ON position.
  - 2. Handle lockable in OFF position.
- C. Enclosures: NEMA KS 1.

1. Interior Dry Locations: Type 1.
2. Exterior Locations: Type 3R.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install enclosed switches in accordance with manufacturer's instructions.
- B. Install enclosed switches securely, in a neat and workmanlike manner in accordance with NECA 1.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Provide required supports in accordance with Section 26 0529.
- E. Install enclosed switches plumb.
- F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.
- G. Provide grounding and bonding in accordance with Section 26 0526.
- H. Provide identification nameplate for each enclosed switch in accordance with Section 26 0553.
- I. Provide arc flash warning labels in accordance with NFPA 70.
- J. Install fuses in fusible disconnect switches.
- K. Apply adhesive tag on inside door of each fused switch indicating NEMA fuse class and size installed.

## **END OF SECTION**

## **SECTION 26 5100**

### **INTERIOR LIGHTING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Interior luminaires.
- B. Ballasts.
- C. Lamps.

##### **1.02 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- B. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; National Electrical Contractors Association.
- C. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; National Electrical Contractors Association.
- D. NFPA 70 - National Electrical Code; National Fire Protection Association.
- E. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association.
- F. UL 1598 - Luminaires; Current Edition, Including All Revisions.

##### **1.03 SUBMITTALS**

- A. Shop Drawings: Indicate dimensions and components for each fixture that is not a standard product of the manufacturer.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.
- C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- D. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Conform to requirements of NFPA 70 and NFPA 101.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.

##### **1.05 EXTRA MATERIALS**

- A. Furnish two of each plastic lens type.
- B. Furnish 5%, not less than 4, replacement lamps for each lamp type.
- C. Furnish two of each ballast type.

**1.06 SUBSTITUTION ITEMS REQUIRING PRIOR APPROVAL**

- A. All items that the CONTRACTOR proposes to use in the work, that are not specifically named in the contract documents, must be submitted for review/approval. Such items must be submitted in duplicate to the ARCHITECT and/or ENGINEER for approval a minimum of ten (10) days prior to bid opening. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.
- B. Lighting Substitutions:
  - 1. Furnish lighting fixtures as scheduled on drawings.
  - 2. Lighting fixture substitutions may be considered for approval by the ARCHITECT/ENGINEER only if all of the following criteria are met:
    - a. Provide specification cut sheets marked-up to clearly identify the proposed luminaire including features, options, accessories, etc. required to match products indicated in the schedules.
    - b. Provide detailed point-by-point lighting calculations for all areas proposed luminaire will be installed.
    - c. Submit all cut sheets, calculations, etc. to the ARCHITECT/ENGINEER no less than 10 days prior to bid date. Substitutions submitted after this date will not be considered.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Lithonia Lighting.
- B. Cooper Lighting.
- C. Hubbell Lighting.
- D. Or as noted in lighting schedule on the drawings.

**2.02 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products that comply with requirements of NFPA 70 and NFPA 101.
- D. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- E. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- F. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.
- G. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

**2.03 LUMINAIRES**

- A. Furnish products as indicated in Schedule included on the Drawings.

## **2.04 BALLASTS**

### **A. All Ballasts:**

1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

## **2.05 LAMPS**

### **A. All Lamps:**

1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the ENGINEER to be inconsistent in perceived color temperature.

### **B. Lamp Types: As specified for each fixture.**

### **C. Fluorescent Lamps:**

1. T8 lamps shall be rapid start, 4,100K temperature lamps, unless noted otherwise.
2. Manufacturers:
  - a. Osram Sylvania.
  - b. General Electric.
  - c. Phillips.

### **D. High Intensity Discharge (HID) Lamps:**

1. Manufacturers:
  - a. Osram Sylvania.
  - b. General Electric.
  - c. Phillips.
  - d. Venture.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship), NECA 500 (commercial lighting), and NECA 502 (industrial lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Install suspended luminaires using pendants supported from swivel hangers (except where noted to use chain hangers). Provide pendant length required to suspend luminaire at indicated height.
- F. Support luminaires independent of ceiling framing.



- G. Locate recessed ceiling luminaires as indicated on reflected ceiling plan.
- H. Install surface mounted luminaires plumb and adjust to align with building lines and with each other. Secure to prevent movement.
- I. Exposed Grid Ceilings: Support surface mounted luminaires in grid ceiling directly from building structure.
- J. Install recessed luminaires to permit removal from below.
- K. Install recessed luminaires using accessories and firestopping materials to meet regulatory requirements for fire rating.
- L. Install clips to secure recessed grid-supported luminaires in place.
- M. Install wall mounted luminaires at height as indicated on Drawings.
- N. Install accessories furnished with each luminaire.
- O. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within fixture; use flexible conduit.
- P. Connect luminaires to branch circuit outlets provided under Section 26 0537 using flexible conduit.
- Q. Make wiring connections to branch circuit using building wire with insulation suitable for temperature conditions within luminaire.
- R. Bond products and metal accessories to branch circuit equipment grounding conductor.
- S. Install specified lamps in each luminaire.
- T. Install lamps in each luminaire.
- U. All night lights, emergency lights, and exit signs shall be circuited from the unswitched hot leg of the general lighting circuit for the area served by the night/emergency/exit lights.
- V. Coordinate location of emergency battery ballast unit remote test switch/charge light with Architect prior to rough-in.
- W. Remote mount battery packs for emergency ballasts in ceiling spaces above heated areas for outdoor emergency fixtures.

### **3.02 FIELD QUALITY CONTROL**

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by ENGINEER.

### **3.03 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by ENGINEER. Secure locking fittings in place.
- B. Aim and adjust fixtures as indicated.

### **3.04 CLEANING**

- A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.
- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosures.

- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

**3.05 PROTECTION**

- A. Relamp luminaires that have failed lamps at Substantial Completion.

**3.06 SCHEDULE - See Drawings**

**END OF SECTION**

## **SECTION 26 5600**

### **EXTERIOR LIGHTING**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Exterior luminaires.
- B. Ballasts.
- C. Lamps.

##### **1.02 REFERENCE STANDARDS**

- A. ANSI C82.1 - American National Standard for Lamp Ballast - Line Frequency Fluorescent Lamp Ballast.
- B. ANSI C82.4 - American National Standard for Ballasts for High-Intensity-Discharge and Low Pressure Sodium Lamps (Multiple-Supply Type).
- C. NECA 1 - Standard for Good Workmanship in Electrical Contracting; National Electrical Contractors Association.
- D. NECA/IESNA 501 - Recommended Practice for Installing Exterior Lighting Systems.
- E. NFPA 70 - National Electrical Code; National Fire Protection Association.
- F. UL 1598 - Luminaires; Current Edition, Including All Revisions.

##### **1.03 SUBMITTALS**

- A. Shop Drawings: Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
- C. Test Reports: Indicate measured illumination levels.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

##### **1.04 QUALITY ASSURANCE**

- A. Conform to requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 10 years documented experience.
- C. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- D. All lighting systems shall provided/installed to meet applicable building codes (i.e. N.E.C, Life Safety Code NFPA 101, Energy Code, etc.).
  - 1. Contractor shall design/provide/install lighting controls (i.e. occupancy sensors, lighting relay control panels, photocells, etc.) as required to comply with the Michigan Energy Code.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.
- C. Receive, handle, and store wood poles in accordance with ANSI O5.1.

**1.06 COORDINATION**

- A. Furnish bolt templates and pole mounting accessories to installer of pole foundations.

**1.07 SUBSTITUTION ITEMS REQUIRING PRIOR APPROVAL**

- A. All items that the CONTRACTOR proposes to use in the work, that are not specifically named in the contract documents, must be submitted for review/approval. Such items must be submitted in duplicate to the ARCHITECT and/or ENGINEER for approval a minimum of ten (10) days prior to bid opening. Requests for prior approval must be accompanied by complete catalog information, including but not limited to, model, size, accessories, complete electrical information and performance data in the form given in the equipment schedule on the drawings at stated design conditions. Where items are referred to by symbolic designations on the drawings, all requests for prior approval shall bear the same designations.
- B. Lighting Substitutions:
  - 1. Furnish lighting fixtures as scheduled on drawings.
  - 2. Lighting fixture substitutions may be considered for approval by the ARCHITECT/ENGINEER only if all of the following criteria are met:
    - a. Provide specification cut sheets marked-up to clearly identify the proposed luminaire including features, options, accessories, etc. required to match products indicated in the schedules.
    - b. Provide detailed point-by-point lighting calculations for all areas proposed luminaire will be installed.
    - c. Submit all cut sheets, calculations, etc. to the ARCHITECT/ENGINEER no less than 10 days prior to bid date. Substitutions submitted after this date will not be considered.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Cooper Lighting Group.
- B. Lithonia.
- C. Hubbell Lighting Group Products.
- D. Or as noted in lighting schedule on the drawings.

**2.02 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the Drawings.

**2.03 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets,

ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.
- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

## **2.04 BALLASTS**

- A. All Ballasts:
  - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
  - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. High Intensity Discharge (HID) Ballasts: ANSI C82.4, metal halide or high pressure sodium lamp ballast, suitable for lamp specified.
  - 1. Voltage: Match luminaire voltage.
  - 2. Manufacturers:
    - a. Advance.
    - b. Magnetic-Universal.
    - c. Valmount-Electric.

## **2.05 LAMPS**

- A. Manufacturers:
  - 1. GE Lighting: [www.gelighting.com](http://www.gelighting.com).
  - 2. Philips Lighting Co of NA: [www.lighting.philips.com](http://www.lighting.philips.com).
  - 3. Osram Sylvania.
- B. All Lamps:
  - 1. Unless explicitly excluded, provide new, compatible, operable lamps in each luminaire.
  - 2. Verify compatibility of specified lamps with luminaires to be installed. Where lamps are not specified, provide lamps per luminaire manufacturer's recommendations.
  - 3. Minimum Efficiency: Provide lamps complying with all current applicable federal and state lamp efficiency standards.
  - 4. Color Temperature Consistency: Unless otherwise indicated, for each type of lamp furnish products which are consistent in perceived color temperature. Replace lamps that are determined by the ENGINEER to be inconsistent in perceived color temperature.
- C. Lamp Types: As specified for each luminaire.
  - 1. Note: All lamps for exterior lighting operating at more than 100 watts shall have lamps with a minimum efficacy of 60 lm/W.

## **2.07 COMPOSITE HANDHOLES**

- A. Manufacturer:
  - 1. Quazite.
- B. Composite handholds shall be constructed of polymer concrete and reinforced by a heavy weave fiberglass. The handholes shall have internal dimensions not less than that indicated. The

material shall have the following properties:

1. Compressive strength: 11,000 PSI; Tensile strength: 1,700 PSI; Flexural strength: 7,500 PSI.

## **2.08 STANDARD LIGHTING FOUNDATIONS**

- A. Construct foundations of reinforced concrete complete with anchors, conduit, and grounding.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 26 0537 as required for installation of luminaires provided under this section.
- B. Install products according to manufacturer's instructions.
- C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 1 (general workmanship) and NECA/IESNA 501 (exterior lighting).
- D. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- E. Install accessories furnished with each luminaire.
- F. Bond products and metal accessories to branch circuit equipment grounding conductor.
- G. Provide concrete bases for bollards at locations indicated, in accordance with Section 03 3000.
- H. Install lamps in each luminaire.
- I. Bond luminaires, metal accessories, and metal poles to branch circuit equipment grounding conductor. Provide supplementary grounding electrode at each pole.
- J. All night lights, emergency lights, and exit signs shall be circuited from the unswitched hot leg of the general lighting circuit for the area served by the night/emergency/exit lights.
- K. Coordinate location of remote test switch/charge light with architect prior to rough-in.
- L. Remote mount battery packs for emergency ballasts in ceiling spaces above heated areas for outdoor emergency fixtures.

### **3.02 CONCRETE WORK FOR ELECTRICAL WORK**

- A. Provide materials and labor for concrete work including concrete, forming, pouring and reinforcing for lighting standard foundations. Use concrete having a minimum compressive strength of 4000 psi in 28 days, unless otherwise indicated. Use air-entrained concrete for applications exposed to the weather.

### **3.03 FIELD QUALITY CONTROL**

- A. Inspect each product for damage and defects.
- B. Operate each luminaire after installation and connection to verify proper operation.
- C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by ENGINEER.

### **3.04 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by ENGINEER. Secure locking fittings in place.
- B. Aim and adjust luminaires to provide illumination levels and distribution as directed.

### **3.05 CLEANING**

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

- B. Clean electrical parts to remove conductive and deleterious materials.
- C. Remove dirt and debris from enclosure.
- D. Clean photometric control surfaces as recommended by manufacturer.
- E. Clean finishes and touch up damage.

**3.06 SCHEDULE - See Drawings**

**END OF SECTION**



## **SECTION 28 3100**

### **FIRE DETECTION AND ALARM**

#### **PART 1 GENERAL**

##### **1.01 SECTION INCLUDES**

- A. Fire alarm system design and installation, including all components, wiring, and conduit.
- B. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.
- C. Maintenance of fire alarm system under contract for specified warranty period.

##### **1.02 REFERENCE STANDARDS**

- A. IEEE C62.41.2 - Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits
- B. IEEE C62.41 - IEEE Recommended Practice on Surge Voltages in Low-Voltage Power Circuits.
- C. NFPA 70 - National Electrical Code.
- D. NFPA 72 - National Fire Alarm Code and Signaling Code.
- E. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures.
- F. Applicable Building Code.

##### **1.03 SUBMITTALS**

- A. Drawings must be prepared as DXF-format CAD drawings.
  - 1. OWNER will provide floor plan drawings for CONTRACTOR's use; verify all dimensions on OWNER-provided drawings.
- B. Evidence of designer qualifications.
- C. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
  - 1. Copy (if any) of list of data required by authority having jurisdiction.
  - 2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
  - 3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
  - 4. System zone boundaries and interfaces to fire safety systems.
  - 5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
  - 6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
  - 7. List of all devices on each signaling line circuit, with spare capacity indicated.
  - 8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.
  - 9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
  - 10. Certification by either the manufacturer of the control unit or by the manufacturer of each

other component that the components are compatible with the control unit.

11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
  12. Certification by CONTRACTOR that the system design complies with the contract documents.
  13. Do not show existing components to be removed.
- D. Evidence of installer qualifications.
- E. Evidence of maintenance contractor qualifications, if different from installer.
- F. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
  2. Submit documentation of satisfactory inspections and tests.
  3. Submit NFPA 72 "Inspection and Test Form," filled out.
- G. Operating and Maintenance Data: Revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Original copy of NFPA 72 with portions that are not relevant to this project neatly crossed out by hand; label with project name and date.
  2. Complete set of specified design documents, as approved by authority having jurisdiction.
  3. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
  4. Contact information for firm that will be providing contract maintenance and trouble call-back service.
  5. List of recommended spare parts, tools, and instruments for testing.
  6. Replacement parts list with current prices, and source of supply.
  7. Detailed troubleshooting guide and large scale input/output matrix.
  8. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to OWNER.
  9. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.
- H. Project Record Documents: Have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
  2. "As installed" wiring and schematic diagrams, with final terminal identifications.
  3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.
- I. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with his installation requirements, is complete, and is in satisfactory operating condition.
  2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.
  3. Certificate of Occupancy.

**1.04 QUALITY ASSURANCE**

- A. Copies of Design Criteria Documents: Maintain at the project site for the duration of the project, bound together, an original copy of NFPA 72, the relevant portions of applicable codes, and instructions and guidelines of authorities having jurisdiction; deliver to OWNER upon completion.
- B. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, CONTRACTOR, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.
- C. Installer Qualifications: Firm with minimum 5 YEARS documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
  - 1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.
  - 2. Installer Personnel: At least 3 YEARS of experience installing fire alarm systems.
  - 3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.
  - 4. Contract maintenance office located within 100 miles of project site.
  - 5. Certified in as fire alarm installer.
- D. Maintenance Contractor Qualifications: Same entity as installer or different entity with specified qualifications.
- E. Instructor Qualifications: Experienced in technical instruction, understanding fire alarm theory, and able to provide the required training; trained by fire alarm control unit manufacturer.

**1.05 WARRANTY**

- A. Provide control panel manufacturer's warranty that system components other than wire and conduit are free from defects and will remain so for 1 year after date of Substantial Completion.
- B. Provide installer's warranty that the installation is free from defects and will remain so for 1 year after date of Substantial Completion.

**1.06 GENERAL REQUIREMENTS**

- A. Refer to 280001 - General Electronic Safety and Security Requirements for general requirements of this specification section.
- B. Refer to 260001 - General Electrical Requirements for general requirements of this specification section.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Fire Alarm Control Units – Existing Silent Knight #5208 (Contractor to field verify)
- B. Initiating Devices, and Notification Appliances:
  - 1. Same manufacturer as control unit.
  - 2. Provide all initiating devices and notification appliances made by the same manufacturer.

**2.02 FIRE ALARM SYSTEM**

- A. Fire Alarm System: Provide additions/modifications to the existing automatic fire detection and alarm system (Silent Knight #5208 – Contractor to field verify):
  - 1. Provide design and installation of all components/wiring/conduit/etc. necessary to provide a

complete/functional system per NFPA 72. The contract documents are diagrammatical in nature and should not be used or bid as detailed design drawings. The fire alarm contractor shall provide any/all design and construction required for the entire fire alarm system and bid the project as such.

2. Protected Premises: Additions/Renovations shown on drawings.
  3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
    - a. The Americans With Disabilities Act (ADA).
    - b. The requirements of the State Fire Marshal.
    - c. The requirements of the local authority having jurisdiction.
    - d. Applicable local codes.
    - e. The contract documents (drawings and specifications).
    - f. NFPA 101.
    - g. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
    - h. Local Fire Department/Authority requirements.
  4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
  5. Hearing Impaired Occupants: Provide visible notification devices in all public areas and in dwelling units.
  6. Fire Command Center: Existing – Contractor to field verify.
  7. Master Control Unit (Panel): Existing, located at fire command center.
  8. The fire alarm designer/installer shall visit the site to familiarize himself with the project's existing conditions and determine the full extent and character of his work.
- B. Circuits:
1. Initiating Device Circuits (IDC): Class B, Style C.
  2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 4.
  3. Notification Appliance Circuits (NAC): Class B, Style Y.
  4. All circuits shall be installed in conduit.
- C. Spare Capacity:
1. Initiating Device Circuits: Minimum 25 percent spare capacity.
  2. Notification Appliance Circuits: Minimum 25 percent spare capacity.
  3. Speaker Amplifiers: Minimum 25 percent spare capacity.
  4. Master Control Unit: Capable of handling all circuits utilized to capacity without requiring additional components other than plug-in control modules.
- D. Power Sources:
1. Primary: Dedicated branch circuits of the facility power distribution system.
  2. Secondary: Storage batteries.
  3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.

4. Each Computer System: Provide uninterruptible power supply (UPS).

### **2.03 EXISTING COMPONENTS**

- A. Existing Fire Alarm System: Remove existing components indicated and incorporate remaining components into new system, under warranty as if they were new; do not take existing portions of system out of service until new portions are fully operational, tested, and connected to existing system.
- B. On-Premises Supervising Station: Include as part of this work all modifications necessary to existing supervising station to accommodate new fire alarm work.
- C. Clearly label components that are "Not In Service."
- D. Remove unused existing components and materials from site and dispose of properly.

### **2.04 FIRE SAFETY SYSTEMS INTERFACES**

- A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
  1. Clean Agent Fire Suppression (CAFS) system control valves, flow switches, etc..
- B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
  1. Clean Agent Fire Suppression system release or trouble.
  2. Archives room smoke detectors.
- C. Doors:
  1. Overhead Coiling Fire Doors: Release upon activation of smoke detectors in smoke zone on either side of door, upon alarm from manual pull station on same floor, and upon sprinkler activation on same floor.

### **2.05 COMPONENTS**

- A. General:
  1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
    - a. Provide matching shrouds to cover sides of new devices that are installed on surface mounted J-boxes.
  2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.
  3. Drawings are diagrammatic and indicate the general scope of work. Provide design and installation of all initiating devices, notification appliances, circuits, etc. required for a complete/functional system per NFPA 72, Life Safety Code, and applicable building codes, whether accurately shown on the drawings or not.
- B. Fire Alarm Control Units, Initiating Devices, and Notification Appliances: Addressable Type; listed by Underwriters Laboratories as suitable for the purpose intended.
- C. Initiating Devices:
  1. Manual Pull Stations.
    - a. Provide 1 extra.
  2. Smoke Detectors.
    - a. Provide 1 extra.
- D. Notification Appliances:
  1. Horn/Strobes: All horn/strobes shall have field adjustable candela options of 15, 30, 75, 95, and 110 candela.

- a. Provide 1 extra.
- E. Circuit Conductors: Copper or optical fiber; provide 200 feet (60 m) extra; color code and label.
- F. Provide weatherproof devices in wet/damp locations (i.e. outdoors, shower rooms, locker rooms, pool/spa areas, etc.)
- G. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.
  - 1. Equipment Connected to Alternating Current Circuits: Maximum let through voltage of 350 V(ac), line-to-neutral, and 350 V(ac), line-to-line; do not use fuses.
- H. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
  - 1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
  - 2. Provide one for each control unit where operations are to be performed.
  - 3. Obtain approval of OWNER prior to mounting; mount in location acceptable to OWNER.
  - 4. Provide extra copy with operation and maintenance data submittal.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.
- B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.
- C. Obtain OWNER's approval of locations of devices, before installation.
- D. Install instruction cards and labels.

#### **3.02 INSPECTION AND TESTING FOR COMPLETION**

- A. Notify OWNER 7 days prior to beginning completion inspections and tests.
- B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.
- C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.
- D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.
- E. Provide all tools, software, and supplies required to accomplish inspection and testing.
- F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.
- G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

#### **3.03 OWNER PERSONNEL INSTRUCTION**

- A. Provide the following instruction to designated OWNER personnel:
  - 1. Hands-On Instruction: On-site, using operational system.
- B. Maintenance Technicians: Detailed training for electrical technicians, on programming, maintaining, repairing, and modifying; factory training:
  - 1. Training: One 1-day session, pre-closeout.
- C. Furnish the services of instructors and teaching aids; have copies of operation and maintenance

data available during instruction.

### **3.04 CLOSEOUT**

- A. Closeout Demonstration: Demonstrate proper operation of all functions to OWNER.
  - 1. Be prepared to conduct any of the required tests.
  - 2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
  - 3. Have authorized technical representative of control unit manufacturer present during demonstration.
  - 4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
  - 5. Repeat demonstration until successful.
- B. Substantial Completion of the project cannot be achieved until inspection and testing is successful and:
  - 1. Approved operating and maintenance data has been delivered.
  - 2. All aspects of operation have been demonstrated to OWNER.
  - 3. Final acceptance of the fire alarm system has been given by authorities having jurisdiction.
  - 4. Occupancy permit has been granted.
  - 5. Specified pre-closeout instruction is complete.
- C. Perform post-occupancy instruction within 3 months after Substantial Completion.

## **END OF SECTION**



**SECTION 31 05 13**  
**SOILS FOR EARTHWORK**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Subsoil materials.
  - 2. Topsoil materials.
- B. Related Sections:
  - 1. Section 01 57 13 – Temporary Erosion and Sedimentation Controls: Slope protection and erosion control.
  - 2. Section 31 05 16 - Aggregates for Earthwork.
  - 3. Section 31 10 00 – Site Clearing.
  - 4. Section 31 22 13 - Rough Grading.
  - 5. Section 31 23 16 - Excavation.
  - 6. Section 31 23 23 - Fill.
  - 7. Section 32 91 19 - Landscape Grading.
  - 8. Section 32 92 19 - Seeding.
  - 9. Section 32 92 23 - Sodding.

**1.2 REFERENCES**

- A. MDOT Standards:
  - 1. Michigan Department of Transportation Standard Specifications for Construction.
- B. ASTM International:
- C. ASTM International:
  - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
  - 2. ASTM D2487 - Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System).

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, 10lb sample of each type of fill to testing laboratory.
- C. Materials Source: Submit name of imported materials source.

**1.4 QUALITY ASSURANCE**

- A. Furnish each imported soil material from single source throughout the Work.
- B. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

## PART 2 PRODUCTS

### 2.1 SUBSOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Subbase: Soil Type S1:
  - 1. ASTM D2487 Soil Classification Groups GW, GP, GM, SW, SP, and SM, or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetable, contaminates and other deleterious matter.
  - 2. Material shall be acceptable to the Soils Engineer or Architect in the absence thereof.
- C. Source of borrow material shall be approved by Soils Engineer or Architect in the absence thereof prior to delivery of any borrow material to the job site.

### 2.2 TOPSOIL MATERIALS

- A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- B. Topsoil: Soil Type S2:
  - 1. Excavated and reused material.
  - 2. Free of roots, rocks larger than 1/2 inch, subsoil, debris, large weeds, and foreign matter.
- C. Source of borrow material shall be approved by Soils Engineer or Architect in the absence thereof prior to delivery of any borrow material to the job site.

### 2.3 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services testing and analysis of soil material.
- B. Testing and Analysis of Subbase Soil Type S1: Perform in accordance with ASTM C136.
- C. Furnish materials of each type from same source throughout the Work.

## PART 3 EXECUTION

### 3.1 STOCKPILING

- A. Stockpile materials on site at locations designated by the Owner and/or Architect/Engineer.
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate differing materials with dividers or stockpile apart to prevent mixing.
- D. Stockpile topsoil 8 feet high maximum.
- E. Prevent intermixing of soil types or contamination.

- F. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

### 3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

**END OF SECTION**

## **SECTION 31 05 16**

### **AGGREGATES FOR EARTHWORK**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Coarse aggregate materials.
  - 2. Fine aggregate materials.
- B. Related Sections:
  - 1. Section 01 57 13 – Temporary Erosion and Sedimentation Controls: Slope protection and erosion control.
  - 2. Section 31 05 13 - Soils for Earthwork: Fill and grading materials.
  - 3. Section 31 22 13 - Rough Grading.
  - 4. Section 31 23 23 - Fill.
  - 5. Section 32 11 23 - Aggregate Base Courses.
  - 6. Section 32 91 19 - Landscape Grading.

##### **1.2 REFERENCES**

- A. American Association of State Highway and Transportation Officials:
  - 1. AASHTO M147 - Standard Specification for Materials for Aggregate and Soil-Aggregate Subbase, Base and Surface Courses.
  - 2. AASHTO T180 - Standard Specification for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop.
- B. ASTM International:
  - 1. ASTM C136 - Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates.
- C. MDOT Standards:
  - 1. Michigan Department of Transportation Standard Specifications for Construction.

##### **1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Samples: Submit, in air-tight containers, 10 lb sample of each type of fill to testing laboratory.
- C. Materials Source: Submit name of imported materials suppliers.

##### **1.4 QUALITY ASSURANCE**

- A. Furnish each aggregate material from single source throughout the Work.
- B. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

## PART 2 PRODUCTS

### 2.1 COARSE AGGREGATE MATERIALS

- A. Coarse Aggregate Type A1: Aggregate 22A conforming to MDOT specifications.

### 2.2 FINE AGGREGATE MATERIALS

- A. Fine Aggregate Type A2: Conforming to MDOT Class II standard for granular material up to 3" diameter.

### 2.3 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing and inspection services.
- B. Coarse Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136.
- C. Fine Aggregate Material - Testing and Analysis: Perform in accordance with ASTM C136.
- D. When tests indicate materials do not meet specified requirements, change material and retest.

## PART 3 EXECUTION

### 3.1 STOCKPILING

- A. Stockpile materials on site at locations [indicated] [designated by Architect/Engineer].
- B. Stockpile in sufficient quantities to meet Project schedule and requirements.
- C. Separate different aggregate materials with dividers or stockpile individually to prevent mixing.
- D. Direct surface water away from stockpile site to prevent erosion or deterioration of materials.

### 3.2 STOCKPILE CLEANUP

- A. Remove stockpile, leave area in clean and neat condition. Grade site surface to prevent free standing surface water.

**END OF SECTION**

## **SECTION 31 10 00**

### **SITE CLEARING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Removing surface debris.
  - 2. Removing designated paving, curbs and improvements.
  - 3. Removing designated trees, shrubs, and other plant life.
  - 4. Removing abandoned utilities.
  - 5. Excavating topsoil.
- B. Related Sections:
  - 1. Section 31 22 13 - Rough Grading.

##### **1.2 REFERENCES**

- A. MDOT Specifications:
  - 1. Michigan Department of Transportation Standard Specifications for Construction.

##### **1.3 QUALITY ASSURANCE**

- A. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

#### **PART 2 PRODUCTS – Not Used**

#### **PART 3 EXECUTION**

##### **3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify existing plant life designated to remain is tagged or identified.

##### **3.2 PREPARATION**

- A. Call Local Utility Line Information service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.

##### **3.3 PROTECTION**

- A. Locate, identify, and protect utilities indicated to remain, from damage.

- B. Protect trees, plant growth, and features designated to remain, as final landscaping as specified in Section 01 50 00.
- C. Protect bench marks, survey control points, and existing structures to remain from damage or displacement.

#### 3.4 CLEARING

- A. Clear areas required for access to site and execution of Work to minimum depth of 6 inches.
- B. Remove trees and shrubs within marked areas. Remove stumps, main root ball, and root system to depth of 12 inches.
- C. Clear undergrowth and deadwood, without disturbing subsoil.

#### 3.5 REMOVAL

- A. Remove debris and extracted plant life from site.
- B. Remove designated paving, curbs, and improvements.
- C. Remove abandoned utilities. Indicated removal termination point for underground utilities on Record Documents.
- D. Continuously clean-up and remove waste materials from site. Do not allow materials to accumulate on site.
- E. Do not burn or bury materials on site. Leave site in clean condition.

#### 3.6 TOPSOIL EXCAVATION

- A. Excavate topsoil from areas to be further excavated, relandscaped, or regraded, without mixing with foreign materials for use in finish grading.
- B. Do not excavate wet topsoil.
- C. Stockpile on site to depth not exceeding 8 feet and protect from erosion. Stockpile material on 36 mil Hypalon material and cover over with same material, until reuse.
- D. Stockpile excess topsoil not intended for reuse in location designated by Owner.

### END OF SECTION

## **SECTION 31 22 13**

### **ROUGH GRADING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Excavating subsoil.
  - 2. Cutting, grading, filling, rough contouring, and compacting, site for site structures, and building pads.
- B. Related Sections:
  - 1. Section 01 57 13 – Temporary Erosion and Sedimentation Controls: Slope protection and erosion control.
  - 2. Section 31 05 13 - Soils for Earthwork: Soils for fill.
  - 3. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
  - 4. Section 31 10 00 - Site Clearing: Excavating topsoil.
  - 5. Section 31 23 16 - Excavating: Building excavation.
  - 6. Section 31 23 23 - Fill: General building area backfilling.
  - 7. Section 32 91 19 - Landscape Grading: Finish grading with topsoil to contours.

##### **1.2 REFERENCES**

- A. Michigan Department of Transportation:
  - 1. MDOT Standard Specifications for Construction.
- B. ASTM International:
  - 1. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 2. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).

##### **1.3 CLOSEOUT SUBMITTALS**

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for submittals.
- B. Project Record Documents: Accurately record actual locations of utilities remaining by horizontal dimensions, elevations or inverts, and slope gradients.

##### **1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

#### **PART 2 PRODUCTS**

##### **2.1 MATERIALS**

- A. Subsoil Fill: Soil Type S1 as specified in Section 31 05 13.



## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify survey bench mark and intended elevations for the Work are as indicated on Drawings.

### 3.2 PREPARATION

- A. Call Local Utility Line Information service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Notify utility company to remove and relocate utilities.
- D. Protect utilities indicated to remain from damage.
- E. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- F. Protect bench marks, survey control point, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

### 3.3 SUBSOIL EXCAVATION

- A. Excavate subsoil from areas to be further excavated, relandscaped, or regraded.
- B. Excavate and process wet material to obtain optimum moisture content.
- C. When excavating through roots, perform Work by hand and cut roots with sharp axe.
- D. Stockpile excavated material in area designated on site in accordance with Section 31 05 13.
- E. Stability: Replace damaged or displaced subsoil as specified for fill.

### 3.4 FILLING

- A. Fill areas to contours and elevations with unfrozen materials.
- B. Place fill material in continuous layers and compact in accordance with schedule at end of this section.
- C. Maintain optimum moisture content of fill materials to attain required compaction density.
- D. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- E. Make grade changes gradual. Blend slope into level areas.

- F. Repair or replace items indicated to remain damaged by excavation or filling.

### 3.5 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Subgrade: Plus or minus 1/10 foot from required elevation.

### 3.6 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

### 3.7 SCHEDULES

- A. Subsoil Fill:
  - 1. Fill Type S1: To subgrade elevation.
  - 2. Compact uniformly to minimum 95 percent of maximum density.

**END OF SECTION**

## **SECTION 31 23 16**

### **EXCAVATION**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Soil densification.
  - 2. Excavating for building foundations.
  - 3. Excavating for slabs-on-grade.
  - 4. Excavating for site structures.
  - 5. Excavating for landscaping.
- B. Related Sections:
  - 1. Section 01 57 13 – Temporary Erosion and Sedimentation Controls: Slope protection and erosion control.
  - 2. Section 31 05 13 - Soils for Earthwork: Stockpiling excavated materials.
  - 3. Section 31 10 00 – Site Clearing: Topsoil removal from site surface.
  - 4. Section 31 22 13 - Rough Grading: Subsoil removal from site surface.
  - 5. Section 31 23 23 - Fill.

##### **1.2 REFERENCES**

- A. Local utility standards when working within 24 inches of utility lines.
- B. Michigan Department of Transportation:
  - 1. MDOT Standard Specifications for Construction.

##### **1.3 QUALITY ASSURANCE**

- A. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

#### **PART 2 PRODUCTS - Not Used**

#### **PART 3 EXECUTION**

##### **3.1 PREPARATION**

- A. Call Local Utility Line Information service not less than three working days before performing Work.
  - 1. Request underground utilities to be located and marked within and surrounding construction areas.
- B. Identify required lines, levels, contours, and datum.
- C. Protect utilities indicated to remain from damage.

- D. Protect plant life, lawns, and other features remaining as portion of final landscaping.
- E. Protect bench marks, survey control points, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

### 3.2 EXCAVATION

- A. Excavate subsoil to accommodate building foundations, slabs-on-grade and site structures.
- B. Compact disturbed load bearing soil in direct contact with foundations to original bearing capacity; perform compaction in accordance with Section 31 23 23.
- C. Slope banks with machine to angle of repose or less until shored.
- D. Do not interfere with 45 degree bearing splay of foundations.
- E. Grade top perimeter of excavation to prevent surface water from draining into excavation.
- F. Trim excavation. Remove loose matter.
- G. Remove lumped subsoil, boulders, and rock up to 1/3 cu yd measured by volume. Remove larger material as specified in Section 31 23 23.
- H. Notify Architect/Engineer of unexpected subsurface conditions.
- I. Correct areas over excavated with structural fill Type A2 as specified in Section 31 23 23.
- J. Stockpile excavated material in area designated on site in accordance with Section 31 05 13.
- K. Repair or replace items indicated to remain damaged by excavation.

### 3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Request inspection of excavation and controlled fill operations in accordance with applicable code.
- C. Request visual inspection of bearing surfaces by inspection agency before installing subsequent work.

### 3.4 PROTECTION

- A. Prevent displacement or loose soil from falling into excavation; maintain soil stability.
- B. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.
- C. Protect structures, utilities and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth operations.

**END OF SECTION**

## **SECTION 31 23 23**

### **FILL**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Backfilling building perimeter to subgrade elevations.
  - 2. Fill under slabs-on-grade.
  - 3. Fill under paving.
  - 4. Fill for over-excavation.
  - 5. Compaction of subgrade and fill materials in place.
- B. Related Sections:
  - 1. Section 01 57 13 – Temporary Erosion and Sedimentation Controls: Slope protection and erosion control.
  - 2. Section 31 05 13 - Soils for Earthwork: Soils for fill.
  - 3. Section 31 05 16 - Aggregates for Earthwork: Aggregates for fill.
  - 4. Section 31 22 13 - Rough Grading: Site filling.
  - 5. Section 31 23 16 - Excavation.
  - 6. Section 32 91 19 - Landscape Grading: Filling of topsoil to finish grade elevation.

##### **1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 2. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- B. Michigan Department of Transportation:
  - 1. MDOT Standard Specifications for Construction.

##### **1.3 QUALITY ASSURANCE**

- A. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

#### **PART 2 PRODUCTS**

##### **2.1 FILL MATERIALS**

- A. Subsoil Fill: Type S1 as specified in Section 31 05 13.
- B. Structural Fill: Type A2 as specified in Section 31 05 16.
- C. Granular Fill: Type A2 as specified in Section 31 05 16.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Coordination and project conditions.
- B. Verify structural ability of unsupported walls to support loads imposed by fill.

### 3.2 PREPARATION

- A. Compact subgrade to density requirements for subsequent backfill materials.
- B. Cut out soft areas of subgrade not capable of compaction in place. Backfill with structural fill and compact to density equal to or greater than requirements for subsequent fill material.
- C. Proof roll to identify soft spots; fill and compact to density equal to or greater than requirements for subsequent fill material.

### 3.3 BACKFILLING

- A. Backfill areas to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.
- C. Place fill material in continuous layers and compact in accordance with schedule at end of this section.
- D. Employ placement method that does not disturb or damage other work.
- E. Maintain optimum moisture content of backfill materials to attain required compaction density.
- F. Backfill against supported foundation walls. Do not backfill against unsupported foundation walls.
- G. Backfill simultaneously on each side of unsupported foundation walls until supports are in place.
- H. Slope grade away from building minimum 2 percent slope for minimum distance of 10 ft, unless noted otherwise.
- I. Make gradual grade changes. Blend slope into level areas.

### 3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top Surface of Backfilling Within Building Areas: Plus or minus 1 inch from required elevations.
- C. Top Surface of Backfilling Under Paved Areas: Plus or minus 1 inch from required elevations.
- D. Top Surface of General Backfilling: Plus or minus 1 inch from required elevations.

### 3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Perform in place compaction tests in accordance with the following:
  - 1. Density Tests: ASTM D2922.
  - 2. Moisture Tests: ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

### 3.6 PROTECTION OF FINISHED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Protecting finished work.
- B. Reshape and re-compact fills subjected to vehicular traffic.

### 3.7 SCHEDULE

- A. Under Building Footings:
  - 1. Subgrade compacted uniformly to 98 percent of maximum density.
- B. Interior Slab-On-Grade:
  - 1. Subgrade compacted to 95 percent.
  - 2. Cover with Fill Type A2, 12 inches thick, compact uniformly to 95 percent of maximum density.
- C. Exterior Side of Foundation Walls:
  - 1. Fill Type A2 (S1 may be used upon approval of the Architect/Engineer), to subgrade elevation, each lift, compact uniformly to 95 percent of maximum density.
- D. Fill to Correct Over-excavation:
  - 1. Fill Type A2, flush to required elevation, compact uniformly to same requirements as area of over excavation.

**END OF SECTION**

## **SECTION 32 11 23**

### **AGGREGATE BASE COURSES**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Aggregate base course.
  - 2. Exposed aggregate paving.
- B. Related Sections:
  - 1. Section 01 57 13 – Temporary Erosion and Sedimentation Controls: Slope protection and erosion control.
  - 2. Section 31 22 13 - Rough Grading: Preparation of site for base course.
  - 3. Section 31 23 23 - Fill: Compacted fill under base course.
  - 4. Section 32 13 13 - Concrete Paving: Finish concrete surface course.
  - 5. Section 32 91 19 - Landscape Grading: Topsoil fill at areas adjacent to aggregate base course.

##### **1.2 REFERENCES**

- A. ASTM International:
  - 1. ASTM D2922 - Standard Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
  - 2. ASTM D3017 - Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth).
- B. Michigan Department of Transportation:
  - 1. MDOT Standard Specifications for Construction.

##### **1.3 QUALITY ASSURANCE**

- A. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

#### **PART 2 PRODUCTS**

##### **2.1 AGGREGATE MATERIALS**

- A. Coarse Aggregate: Fill Type A1 as specified in Section 31 05 16.
- B. Fine Aggregate: Fill Type A2 as specified in Section 31 05 16.



## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify compacted substrate is dry and ready to support paving and imposed loads.
  - 1. Proof roll substrate in minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft substrate and replace with compacted fill as specified in Section 31 23 23.
- C. Verify substrate has been inspected, gradients and elevations are correct.

### 3.2 PREPARATION

- A. Correct irregularities in substrate gradient and elevation by scarifying, reshaping, and re-compacting.
- B. Do not place fill on soft, muddy, or frozen surfaces.

### 3.3 AGGREGATE PLACEMENT

- A. Spread aggregate over prepared substrate to total compacted thickness indicated on Drawings.
- B. Roller or vibratory compact aggregate to requirements specified in this Section.
- C. Level and contour surfaces to elevations, profiles, and gradients indicated.
- D. Add small quantities of fine aggregate to coarse aggregate when required to assist compaction.
- E. Maintain optimum moisture content of fill materials to attain specified compaction density.
- F. Use mechanical tamping equipment in areas inaccessible to compaction equipment.

### 3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation From Flat Surface: 1/4 inch measured with 10 foot straight edge.
- C. Maximum Variation From Thickness: 1/4 inch.
- D. Maximum Variation From Elevation: 1/4 inch.

### 3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting and testing.
- B. Compaction testing will be performed in accordance with ASTM D2922. And ASTM D3017.
- C. When tests indicate Work does not meet specified requirements, remove Work, replace and retest.

D. Frequency of Tests: One test for every 2000 square feet compacted aggregate or fraction thereof.

3.6 COMPACTION

A. Compact materials to 95 percent of maximum density in accordance with ASTM D2922.

3.7 SCHEDULES

A. Exposed Aggregate Paving:

1. Compact subbase to 95 percent maximum density.
2. Aggregate: Aggregate Type A1; 6 inches compacted thickness, compacted to 95 percent maximum density.

B. Concrete Paving and Stoop Base Course:

1. Compact subbase to 95 percent maximum density.
2. Base Course: Aggregate Type A2; 12 inches compacted thickness, compacted to 95 percent maximum density.

**END OF SECTION**

**SECTION 32 13 13**  
**CONCRETE PAVING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Concrete paving for:
    - a. Concrete sidewalks.
    - b. Concrete stoops.
- B. Related Requirements:
  - 1. Section 32 11 23 - Aggregate Base Courses: base course.
  - 2. Section 32 91 19 - Landscape Grading: Preparation of subsoil at pavement perimeter.

**1.2 REFERENCE STANDARDS**

- A. American Concrete Institute:
  - 1. ACI 301 - Specifications for Structural Concrete.
- B. ASTM International:
  - 1. ASTM C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - 2. ASTM D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).

**1.3 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data:
  - 1. Submit data on concrete materials, joint filler, admixtures, curing compounds.

**1.4 QUALITY ASSURANCE**

- A. Perform Work in accordance with ACI 301.
- B. Obtain cementitious materials from same source throughout.

**1.5 QUALIFICATIONS**

- A. Manufacturer: Company specializing in manufacturing Products specified in this section with minimum three years experience.
- B. Installer: Company specializing in performing work of this section.

## 1.6 AMBIENT CONDITIONS

- A. Section 01 50 00 - Temporary Facilities and Controls: Ambient conditions control facilities for product storage and installation.
- B. Do not place concrete when base surface temperature is less than 40 degrees F, or surface is wet or frozen.

## PART 2 PRODUCTS

### 2.1 CONCRETE PAVING

- A. Form Materials:
  - 1. Form Materials: As specified in Section 03 10 00.
  - 2. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt, 1/4 inch thick.
- B. Reinforcement:
  - 1. Reinforcing Steel and Wire Fabric: As specified in Section 03 20 00.
- C. Concrete Mix:
  - 1. Concrete Mix: As specified in Section 03 30 00

### 2.2 ACCESSORIES

- A. Curing Compound: ASTM C309, Type 1, Class A.

### 2.3 SOURCE QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Testing and Inspection Services: Provide mix design for concrete.
- B. Submit proposed mix design to appointed firm for review prior to commencement of Work.
- C. Tests on cement, aggregates, and mixes will be performed to ensure conformance with specified requirements.
- D. Test samples in accordance with ACI 301.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation examination.
- B. Verify compacted aggregate base is dry and ready to support paving and imposed loads.
  - 1. Proof roll base with in minimum two perpendicular passes to identify soft spots.
  - 2. Remove soft subbase and replace with compacted fill as specified in Section 31 23 23.
- C. Verify gradients and elevations of base are correct.

### 3.2 PREPARATION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for installation preparation.
- B. Moisten substrate to minimize absorption of water from fresh concrete.
- C. Coat surfaces of manhole or catch basin frames with oil to prevent bond with concrete paving.
- D. Notify Architect/Engineer minimum 24 hours prior to commencement of concreting operations.

### 3.3 INSTALLATION

- A. Forms:
  - 1. Place and secure forms and screeds to correct location, dimension, profile, and gradient.
  - 2. Assemble formwork to permit easy stripping and dismantling without damaging concrete.
- B. Reinforcement:
  - 1. Place reinforcing at mid-height of paving.
  - 2. Interrupt reinforcing at expansion joints.
- C. Placing Concrete:
  - 1. Place concrete in accordance with ACI 301.
  - 2. Ensure reinforcing, inserts, embedded parts, and formed joints are not disturbed during concrete placement.
  - 3. Place concrete continuously over the full width of the panel and between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.
  - 4. Place concrete to joint pattern indicated.
- D. Joints
  - 1. Place expansion joints at intervals indicated in Drawings.
  - 2. Place joint filler between paving components and building or other appurtenances.
  - 3. Provide scored or sawn joints at intervals indicated on Drawings.
- E. Finishing:
  - 1. Area Paving: Light broom.
  - 2. Sidewalk Paving: Light broom.
  - 3. Curbs and Gutters: Light broom.
  - 4. Direction of Texturing: Perpendicular to traffic direction.
  - 5. Inclined Ramps: grooved perpendicular to slope.
- F. Curing and Protection
  - 1. Place curing compound on exposed concrete surfaces immediately after finishing.
  - 2. Protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
  - 3. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

### 3.4 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Maximum Variation of Surface Flatness: 1/4 inch in 10 ft.

- C. Maximum Variation From True Position: 1/4 inch.

### 3.5 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Requirements for inspecting, testing.
- B. Testing firm will take cylinders and perform slump and air entrainment tests in accordance with ACI 301 as required under Section 03 30 00.
- C. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

### 3.6 PROTECTION

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Immediately after placement, protect paving from premature drying, excessive hot or cold temperatures, and mechanical injury.
- C. Do not permit pedestrian or vehicular traffic over paving for 7 days minimum after finishing.

**END OF SECTION**

**SECTION 32 91 19**  
**LANDSCAPE GRADING**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Final grade topsoil for finish landscaping.
- B. Related Sections:
  - 1. Section 31 05 13 - Soils for Earthwork.
  - 2. Section 32 92 19 – Seeding.

**1.2 REFERENCES**

- A. Michigan Department of Transportation:
  - 1. MDOT Standard Specifications for Construction.

**1.3 QUALITY ASSURANCE**

- A. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.

**PART 2 PRODUCTS**

**2.1 MATERIAL**

- A. Topsoil: Soil Type S2 as specified in Section 31 05 13.

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify trench backfilling have been inspected.
- C. Verify substrate base has been contoured and compacted.

**3.2 PREPARATION**

- A. Protect landscaping and other features remaining as final Work.
- B. Protect existing structures, fences, sidewalks, utilities, paving, and curbs.

### 3.3 SUBSTRATE PREPARATION

- A. Eliminate uneven areas and low spots.
- B. Remove debris, roots, branches, stones, in excess of 1/2 inch in size. Remove contaminated subsoil.
- C. Scarify surface to depth of 3 inches where topsoil is scheduled. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

### 3.4 PLACING TOPSOIL

- A. Place topsoil in areas where seeding is required to nominal depth of 6 inches. Place topsoil during dry weather.
- B. Fine grade topsoil to eliminate rough or low areas. Maintain profiles and contour of subgrade.
- C. Remove roots, weeds, rocks, and foreign material while spreading.
- D. Manually spread topsoil close to plant material, building, and pavings to prevent damage.
- E. Lightly compact placed topsoil.
- F. Remove surplus subsoil and topsoil from site.

### 3.5 TOLERANCES

- A. Section 01 40 00 - Quality Requirements: Tolerances.
- B. Top of Topsoil: Plus or minus 1/2 inch.

### 3.6 PROTECTION OF INSTALLED WORK

- A. Section 01 70 00 - Execution and Closeout Requirements: Requirements for protecting finished Work.
- B. Prohibit construction traffic over topsoil.

**END OF SECTION**



## **SECTION 32 92 19**

### **SEEDING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Fertilizing.
  - 2. Seeding.
  - 3. Hydroseeding.
  - 4. Mulching.
  - 5. Maintenance.
- B. Related Sections:
  - 1. Section 32 05 13 - Soils for Exterior Improvements: Topsoil material.
  - 2. Section 32 91 19 - Landscape Grading: Preparation of subsoil and placement of topsoil in preparation for the Work of this section.

##### **1.2 REFERENCES**

- A. Michigan Department of Transportation:
  - 1. MDOT Standard Specifications for Construction.

##### **1.3 DEFINITIONS**

- A. Weeds: Vegetative species other than specified species to be established in given area.

##### **1.4 SUBMITTALS**

- A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit data for seed mix, fertilizer, mulch, and other accessories.

##### **1.5 QUALITY ASSURANCE**

- A. Perform Work in accordance with 2012 MDOT Standard Specifications for Construction.
- B. Provide seed mixture in containers showing percentage of seed mix, germination percentage, inert matter percentage, weed percentage, year of production, net weight, date of packaging, and location of packaging.

##### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Section 01 60 00 - Product Requirements: Product storage and handling requirements.
- B. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- C. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

## PART 2 PRODUCTS

### 2.1 SEED MIXTURE

- A. Seed Mixture:
  - 1. All seed to be used shall be labeled in accordance with the U.S. Department of Agriculture Rules and Regulations under the Federal Seed Act and shall be in accordance with the State seed rules and regulations. Seed mixture shall be "Sunny Mix" with composition of 50% Kentucky Blue Grass, 25% Creeping Red Fescue and 25% Perennial Rye Grass, by weight. Common varieties of specified seed mix will be permitted.

### 2.2 ACCESSORIES

- A. Mulching Material: Oat or wheat straw, free from weeds, foreign matter detrimental to plant life, and dry. Hay or chopped cornstalks are not acceptable.
- B. Fertilizer: Commercial grade; recommended for grass; of proportion necessary to eliminate deficiencies of topsoil: Fertilizer shall be Starter blend, high phosphorous, 15-30-15 composition.
- C. Water: Clean, fresh and free of substances or matter capable of inhibiting vigorous growth of grass.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify prepared soil base is ready to receive the Work of this section.

### 3.2 FERTILIZING

- A. Apply fertilizer at application rate recommended by manufacturer.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at same time or with same machine used to apply seed.
- D. Mix fertilizer thoroughly into upper 2 inches of topsoil.
- E. Lightly water soil to aid dissipation of fertilizer. Irrigate top level of soil uniformly.

### 3.3 SEEDING

- A. Apply seed at rate of 6 to 7 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on same day.
- C. Do not sow immediately following rain, when ground is too dry, or when winds are over 12 mph.

- D. Roll seeded area with roller not exceeding 112 lbs/linear foot.
- E. Immediately following seeding and compacting, apply mulch to a uniform covering. Maintain clear of shrubs and trees.
- F. Apply water with fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

**END OF SECTION**